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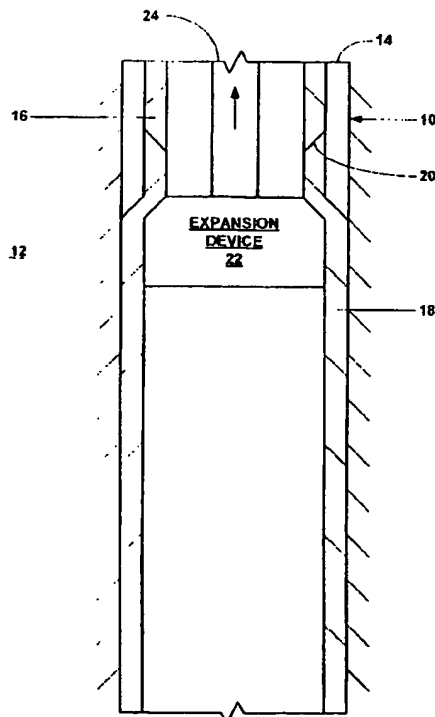
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(54) Title: **THREADED CONNECTION FOR EXPANDABLE TUBULARS**

(57) Abstract: A threaded connection for expandable  
tubulars with at least one stress concentrator.



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**THREADED CONNECTION FOR EXPANDABLE TUBULARS****Cross Reference To Related Applications**

**[0001]** This application claims the benefit of the filing dates of: 1) U.S. provisional patent application serial number 60/499,528, attorney docket number 25791.137, filed on September 2, 2003, the disclosure of which is incorporated herein by reference.

**[0002]** This application is a continuation-in-part of PCT application serial number PCT/US2003/025716, attorney docket number 25791.129.02, filed on 8/18/2003, which was a continuation-in-part of PCT application serial number PCT/US2003/025707, attorney docket number 25791.127.02, filed on 8/18/2003, which was a continuation-in-part of PCT application serial number PCT/US2003/025676, attorney docket number 25791.120.02, filed on 8/18/2003, which was a continuation-in-part of PCT application serial number PCT/US2003/025677, attorney docket number 25791.119.02, filed on 8/18/2003, which was a continuation-in-part of PCT application serial number PCT/US2003/019993, attorney docket number 25791.106.02, filed on 6/24/2003, which was a continuation-in-part of PCT application serial number PCT/US2003/010144, attorney docket number 25791.101.02, filed on 3/31/2003, which was a continuation-in-part of PCT application serial number US2003/006544, attorney docket number 25791.93.02, filed on 3/04/2003, which was a continuation-in-part of PCT application serial number PCT/US2002/039418, attorney docket number 25791.92.02, filed on 12/10/2002.

**[0003]** This application is related to the following co-pending applications: (1) U.S. Patent Number 6,497,289, which was filed as U.S. Patent Application serial no. 09/454,139, attorney docket no. 25791.03.02, filed on 12/3/1999, which claims priority from provisional application 60/111,293, filed on 12/7/98, (2) U.S. patent application serial no. 09/510,913, attorney docket no. 25791.7.02, filed on 2/23/2000, which claims priority from provisional application 60/121,702, filed on 2/25/99, (3) U.S. patent application serial no. 09/502,350, attorney docket no. 25791.8.02, filed on 2/10/2000, which claims priority from provisional application 60/119,611, filed on 2/11/99, (4) U.S. patent no. 6,328,113, which was filed as U.S. Patent Application serial number 09/440,338, attorney docket number 25791.9.02, filed on 11/15/99, which claims priority from provisional application 60/108,558, filed on 11/16/98, (5) U.S. patent application serial no. 10/169,434, attorney docket no. 25791.10.04, filed on 7/1/02, which claims priority from provisional application 60/183,546, filed on 2/18/00, (6) U.S. patent application serial no. 09/523,468, attorney docket no. 25791.11.02, filed on 3/10/2000, which claims priority from provisional application 60/124,042, filed on 3/11/99, (7) U.S. patent number 6,568,471, which was filed as patent application serial no. 09/512,895, attorney docket no. 25791.12.02, filed on 2/24/2000, which claims priority from provisional application 60/121,841, filed on 2/26/99, (8) U.S. patent number 6,575,240, which was filed as patent application serial no. 09/511,941, attorney docket no. 25791.16.02, filed on

embodiment, the predetermined portion of the tubular assembly comprises a second steel alloy comprising: 0.18 % C, 1.28 % Mn, 0.017 % P, 0.004 % S, 0.29 % Si, 0.01 % Cu, 0.01 % Ni, and 0.03 % Cr. In an exemplary embodiment, the yield point of the predetermined portion of the tubular assembly is at most about 57.8 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the tubular assembly is at least about 74.4 ksi after the radial expansion and plastic deformation. In an exemplary embodiment, the yield point of the predetermined portion of the tubular assembly after the radial expansion and plastic deformation is at least about 28 % greater than the yield point of the predetermined portion of the tubular assembly prior to the radial expansion and plastic deformation. In an exemplary embodiment, the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is about 1.04. In an exemplary embodiment, the predetermined portion of the tubular assembly comprises a third steel alloy comprising: 0.08 % C, 0.82 % Mn, 0.006 % P, 0.003 % S, 0.30 % Si, 0.16 % Cu, 0.05 % Ni, and 0.05 % Cr. In an exemplary embodiment, the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is about 1.92. In an exemplary embodiment, the predetermined portion of the tubular assembly comprises a fourth steel alloy comprising: 0.02 % C, 1.31 % Mn, 0.02 % P, 0.001 % S, 0.45 % Si, 9.1 % Ni, and 18.7 % Cr. In an exemplary embodiment, the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is about 1.34. In an exemplary embodiment, the yield point of the predetermined portion of the tubular assembly is at most about 46.9 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the tubular assembly is at least about 65.9 ksi after the radial expansion and plastic deformation. In an exemplary embodiment, the yield point of the predetermined portion of the tubular assembly after the radial expansion and plastic deformation is at least about 40 % greater than the yield point of the predetermined portion of the tubular assembly prior to the radial expansion and plastic deformation. In an exemplary embodiment, the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is at least about 1.48. In an exemplary embodiment, the yield point of the predetermined portion of the tubular assembly is at most about 57.8 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the tubular assembly is at least about 74.4 ksi after the radial expansion and plastic deformation. In an exemplary embodiment, the yield point of the predetermined portion of the tubular assembly after the radial expansion and plastic deformation is at least about 28 % greater than the yield point of the predetermined portion of the tubular assembly prior to the radial expansion and plastic deformation. In an exemplary embodiment, the anisotropy of the predetermined portion of the tubular assembly,

prior to the radial expansion and plastic deformation, is at least about 1.04. In an exemplary embodiment, the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is at least about 1.92. In an exemplary embodiment, the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is at least about 1.34. In an exemplary embodiment, the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, ranges from about 1.04 to about 1.92. In an exemplary embodiment, the yield point of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, ranges from about 47.6 ksi to about 61.7 ksi. In an exemplary embodiment, the expandability coefficient of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is greater than 0.12. In an exemplary embodiment, the expandability coefficient of the predetermined portion of the tubular assembly is greater than the expandability coefficient of the other portion of the tubular assembly. In an exemplary embodiment, the tubular assembly comprises a wellbore casing. In an exemplary embodiment, the tubular assembly comprises a pipeline. In an exemplary embodiment, the tubular assembly comprises a structural support. In an exemplary embodiment, the sleeve comprises: a plurality of spaced apart tubular sleeves coupled to and receiving end portions of the first and second tubular members. In an exemplary embodiment, the first tubular member comprises a first threaded connection; wherein the second tubular member comprises a second threaded connection; wherein the first and second threaded connections are coupled to one another; wherein at least one of the tubular sleeves is positioned in opposing relation to the first threaded connection; and wherein at least one of the tubular sleeves is positioned in opposing relation to the second threaded connection. In an exemplary embodiment, the first tubular member comprises a first threaded connection; wherein the second tubular member comprises a second threaded connection; wherein the first and second threaded connections are coupled to one another; and wherein at least one of the tubular sleeves is not positioned in opposing relation to the first and second threaded connections. In an exemplary embodiment, the carbon content of the tubular member is less than or equal to 0.12 percent; and wherein the carbon equivalent value for the tubular member is less than 0.21. In an exemplary embodiment, the tubular member comprises a wellbore casing.

**[00584]** An expandable tubular member has been described, wherein the carbon content of the tubular member is greater than 0.12 percent; and wherein the carbon equivalent value for the tubular member is less than 0.36. In an exemplary embodiment, the tubular member comprises a wellbore casing.

**[00585]** A method of selecting tubular members for radial expansion and plastic deformation has been described that includes: selecting a tubular member from a collection

of tubular member; determining a carbon content of the selected tubular member; determining a carbon equivalent value for the selected tubular member; and if the carbon content of the selected tubular member is less than or equal to 0.12 percent and the carbon equivalent value for the selected tubular member is less than 0.21, then determining that the selected tubular member is suitable for radial expansion and plastic deformation.

**[00586]** A method of selecting tubular members for radial expansion and plastic deformation has been described that includes: selecting a tubular member from a collection of tubular member; determining a carbon content of the selected tubular member; determining a carbon equivalent value for the selected tubular member; and if the carbon content of the selected tubular member is greater than 0.12 percent and the carbon equivalent value for the selected tubular member is less than 0.36, then determining that the selected tubular member is suitable for radial expansion and plastic deformation.

**[00587]** An expandable tubular member has been described that includes: a tubular body; wherein a yield point of an inner tubular portion of the tubular body is less than a yield point of an outer tubular portion of the tubular body. In an exemplary embodiment, the yield point of the inner tubular portion of the tubular body varies as a function of the radial position within the tubular body. In an exemplary embodiment, the yield point of the inner tubular portion of the tubular body varies in an linear fashion as a function of the radial position within the tubular body. In an exemplary embodiment, the yield point of the inner tubular portion of the tubular body varies in an non-linear fashion as a function of the radial position within the tubular body. In an exemplary embodiment, the yield point of the outer tubular portion of the tubular body varies as a function of the radial position within the tubular body. In an exemplary embodiment, the yield point of the outer tubular portion of the tubular body varies in an linear fashion as a function of the radial position within the tubular body. In an exemplary embodiment, the yield point of the outer tubular portion of the tubular body varies in an non-linear fashion as a function of the radial position within the tubular body. In an exemplary embodiment, the yield point of the inner tubular portion of the tubular body varies as a function of the radial position within the tubular body; and wherein the yield point of the outer tubular portion of the tubular body varies as a function of the radial position within the tubular body. In an exemplary embodiment, the yield point of the inner tubular portion of the tubular body varies in a linear fashion as a function of the radial position within the tubular body; and wherein the yield point of the outer tubular portion of the tubular body varies in a linear fashion as a function of the radial position within the tubular body. In an exemplary embodiment, the yield point of the inner tubular portion of the tubular body varies in a linear fashion as a function of the radial position within the tubular body; and wherein the yield point of the outer tubular portion of the tubular body varies in a non-linear fashion as a function of the radial position within the tubular body. In an exemplary embodiment, the yield

point of the inner tubular portion of the tubular body varies in a non-linear fashion as a function of the radial position within the tubular body; and wherein the yield point of the outer tubular portion of the tubular body varies in a linear fashion as a function of the radial position within the tubular body. In an exemplary embodiment, the yield point of the inner tubular portion of the tubular body varies in a non-linear fashion as a function of the radial position within the tubular body; and wherein the yield point of the outer tubular portion of the tubular body varies in a non-linear fashion as a function of the radial position within the tubular body. In an exemplary embodiment, the rate of change of the yield point of the inner tubular portion of the tubular body is different than the rate of change of the yield point of the outer tubular portion of the tubular body. In an exemplary embodiment, the rate of change of the yield point of the inner tubular portion of the tubular body is different than the rate of change of the yield point of the outer tubular portion of the tubular body.

**[00588]** A method of manufacturing an expandable tubular member has been described that includes: providing a tubular member; heat treating the tubular member; and quenching the tubular member; wherein following the quenching, the tubular member comprises a microstructure comprising a hard phase structure and a soft phase structure. In an exemplary embodiment, the provided tubular member comprises, by weight percentage, 0.065% C, 1.44% Mn, 0.01% P, 0.002% S, 0.24% Si, 0.01% Cu, 0.01% Ni, 0.02% Cr, 0.05% V, 0.01% Mo, 0.01% Nb, and 0.01%Ti. In an exemplary embodiment, the provided tubular member comprises, by weight percentage, 0.18% C, 1.28% Mn, 0.017% P, 0.004% S, 0.29% Si, 0.01% Cu, 0.01% Ni, 0.03% Cr, 0.04% V, 0.01% Mo, 0.03% Nb, and 0.01%Ti. In an exemplary embodiment, the provided tubular member comprises, by weight percentage, 0.08% C, 0.82% Mn, 0.006% P, 0.003% S, 0.30% Si, 0.06% Cu, 0.05% Ni, 0.05% Cr, 0.03% V, 0.03% Mo, 0.01% Nb, and 0.01%Ti. In an exemplary embodiment, the provided tubular member comprises a microstructure comprising one or more of the following: martensite, pearlite, vanadium carbide, nickel carbide, or titanium carbide. In an exemplary embodiment, the provided tubular member comprises a microstructure comprising one or more of the following: pearlite or pearlite striation. In an exemplary embodiment, the provided tubular member comprises a microstructure comprising one or more of the following: grain pearlite, widmanstatten martensite, vanadium carbide, nickel carbide, or titanium carbide. In an exemplary embodiment, the heat treating comprises heating the provided tubular member for about 10 minutes at 790 °C. In an exemplary embodiment, the quenching comprises quenching the heat treated tubular member in water. In an exemplary embodiment, following the quenching, the tubular member comprises a microstructure comprising one or more of the following: ferrite, grain pearlite, or martensite. In an exemplary embodiment, following the quenching, the tubular member comprises a microstructure comprising one or more of the following: ferrite, martensite, or bainite. In an

exemplary embodiment, following the quenching, the tubular member comprises a microstructure comprising one or more of the following: bainite, pearlite, or ferrite. In an exemplary embodiment, following the quenching, the tubular member comprises a yield strength of about 67ksi and a tensile strength of about 95 ksi. In an exemplary embodiment, following the quenching, the tubular member comprises a yield strength of about 82 ksi and a tensile strength of about 130 ksi. In an exemplary embodiment, following the quenching, the tubular member comprises a yield strength of about 60 ksi and a tensile strength of about 97 ksi. In an exemplary embodiment, the method further includes: positioning the quenched tubular member within a preexisting structure; and radially expanding and plastically deforming the tubular member within the preexisting structure.

**[00589]** A method of radially expanding a tubular assembly has been described that includes radially expanding and plastically deforming a lower portion of the tubular assembly by pressurizing the interior of the lower portion of the tubular assembly; and then, radially expanding and plastically deforming the remaining portion of the tubular assembly by contacting the interior of the tubular assembly with an expansion device. In an exemplary embodiment, the expansion device is an adjustable expansion device. In an exemplary embodiment, the expansion device is a hydroforming expansion device. In an exemplary embodiment, the expansion device is a rotary expansion device. In an exemplary embodiment, the lower portion of the tubular assembly has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation. In an exemplary embodiment, the remaining portion of the tubular assembly has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation. In an exemplary embodiment, the lower portion of the tubular assembly includes a shoe defining a valveable passage.

**[00590]** A system for radially expanding a tubular assembly has been described that includes means for radially expanding and plastically deforming a lower portion of the tubular assembly by pressurizing the interior of the lower portion of the tubular assembly; and then, means for radially expanding and plastically deforming the remaining portion of the tubular assembly by contacting the interior of the tubular assembly with an expansion device. In an exemplary embodiment, the lower portion of the tubular assembly has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation. In an exemplary embodiment, the remaining portion of the tubular assembly has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

**[00591]** A method of repairing a tubular assembly has been described that includes positioning a tubular patch within the tubular assembly; and radially expanding and



plastically deforming a tubular patch into engagement with the tubular assembly by pressurizing the interior of the tubular patch. In an exemplary embodiment, the tubular patch has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

**[00592]** A system for repairing a tubular assembly has been described that includes means for positioning a tubular patch within the tubular assembly; and means for radially expanding and plastically deforming a tubular patch into engagement with the tubular assembly by pressurizing the interior of the tubular patch. In an exemplary embodiment, the tubular patch has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

**[00593]** A method of radially expanding a tubular member has been described that includes accumulating a supply of pressurized fluid; and controllably injecting the pressurized fluid into the interior of the tubular member. In an exemplary embodiment, accumulating the supply of pressurized fluid includes: monitoring the operating pressure of the accumulated fluid; and if the operating pressure of the accumulated fluid is less than a predetermined amount, injecting pressurized fluid into the accumulated fluid. In an exemplary embodiment, controllably injecting the pressurized fluid into the interior of the tubular member includes: monitoring the operating condition of the tubular member; and if the tubular member has been radial expanded, releasing the pressurized fluid from the interior of the tubular member.

**[00594]** A system for radially expanding a tubular member has been described that includes means for accumulating a supply of pressurized fluid; and means for controllably injecting the pressurized fluid into the interior of the tubular member. In an exemplary embodiment, means for accumulating the supply of pressurized fluid includes: means for monitoring the operating pressure of the accumulated fluid; and if the operating pressure of the accumulated fluid is less than a predetermined amount, means for injecting pressurized fluid into the accumulated fluid. In an exemplary embodiment, means for controllably injecting the pressurized fluid into the interior of the tubular member includes: means for monitoring the operating condition of the tubular member; and if the tubular member has been radial expanded, means for releasing the pressurized fluid from the interior of the tubular member.

**[00595]** An apparatus for radially expanding a tubular member has been described that includes a fluid reservoir; a pump for pumping fluids out of the fluid reservoir; an accumulator for receiving and accumulating the fluids pumped from the reservoir; a flow control valve for controllably releasing the fluids accumulated within the reservoir; and an expansion element for engaging the interior of the tubular member to define a pressure

chamber within the tubular member and receiving the released accumulated fluids into the pressure chamber.

**[00596]** An apparatus for radially expanding a tubular member has been described that includes an expandable tubular member; a locking device positioned within the expandable tubular member releasably coupled to the expandable tubular member; a tubular support member positioned within the expandable tubular member coupled to the locking device; and an adjustable expansion device positioned within the expandable tubular member coupled to the tubular support member; wherein at least a portion of the expandable tubular member has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation. In an exemplary embodiment, the apparatus further includes: means for transmitting torque between the expandable tubular member and the tubular support member. In an exemplary embodiment, the apparatus further includes: means for sealing the interface between the expandable tubular member and the tubular support member. In an exemplary embodiment, the apparatus further includes: another tubular support member received within the tubular support member releasably coupled to the expandable tubular member. In an exemplary embodiment, the apparatus further includes: means for transmitting torque between the expandable tubular member and the other tubular support member. In an exemplary embodiment, the apparatus further includes: means for transmitting torque between the other tubular support member and the tubular support member. In an exemplary embodiment, the apparatus further includes: means for sealing the interface between the other tubular support member and the tubular support member. In an exemplary embodiment, the apparatus further includes: means for sealing the interface between the expandable tubular member and the tubular support member. In an exemplary embodiment, the apparatus further includes: means for sensing the operating pressure within the other tubular support member. In an exemplary embodiment, the apparatus further includes: means for pressurizing the interior of the other tubular support member. In an exemplary embodiment, further includes: means for limiting axial displacement of the other tubular support member relative to the tubular support member. In an exemplary embodiment, the apparatus further includes: a tubular liner coupled to an end of the expandable tubular member. In an exemplary embodiment, the apparatus further includes: a tubular liner coupled to an end of the expandable tubular member.

**[00597]** An apparatus for radially expanding a tubular member has been described that includes: an expandable tubular member; a locking device positioned within the expandable tubular member releasably coupled to the expandable tubular member; a tubular support member positioned within the expandable tubular member coupled to the locking device; an adjustable expansion device positioned within the expandable tubular member

coupled to the tubular support member; means for transmitting torque between the expandable tubular member and the tubular support member; means for sealing the interface between the expandable tubular member and the tubular support member; another tubular support member received within the tubular support member releasably coupled to the expandable tubular member; means for transmitting torque between the expandable tubular member and the other tubular support member; means for transmitting torque between the other tubular support member and the tubular support member; means for sealing the interface between the other tubular support member and the tubular support member; means for sealing the interface between the expandable tubular member and the tubular support member; means for sensing the operating pressure within the other tubular support member; means for pressurizing the interior of the other tubular support member; means for limiting axial displacement of the other tubular support member relative to the tubular support member; and a tubular liner coupled to an end of the expandable tubular member; wherein at least a portion of the expandable tubular member has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

**[00598]** A method for radially expanding a tubular member has been described that includes positioning a tubular member and an adjustable expansion device within a preexisting structure; radially expanding and plastically deforming at least a portion of the tubular member by pressurizing an interior portion of the tubular member; increasing the size of the adjustable expansion device; and radially expanding and plastically deforming another portion of the tubular member by displacing the adjustable expansion device relative to the tubular member. In an exemplary embodiment, the method further includes sensing an operating pressure within the tubular member. In an exemplary embodiment, wherein radially expanding and plastically deforming at least a portion of the tubular member by pressurizing an interior portion of the tubular member includes: injecting fluidic material into the tubular member; sensing the operating pressure of the injected fluidic material; and if the operating pressure of the injected fluidic material exceeds a predetermined value, permitting the fluidic material to enter a pressure chamber defined within the tubular member. In an exemplary embodiment, at least a portion of the tubular member has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation. In an exemplary embodiment, the portion of the tubular member comprises the pressurized portion of the tubular member.

**[00599]** A system for radially expanding a tubular member has been described that includes means for positioning a tubular member and an adjustable expansion device within a preexisting structure; means for radially expanding and plastically deforming at least a portion of the tubular member by pressurizing an interior portion of the tubular member;

means for increasing the size of the adjustable expansion device; and means for radially expanding and plastically deforming another portion of the tubular member by displacing the adjustable expansion device relative to the tubular member. In an exemplary embodiment, the system further includes: sensing an operating pressure within the tubular member. In an exemplary embodiment, radially expanding and plastically deforming at least a portion of the tubular member by pressurizing an interior portion of the tubular member includes: injecting fluidic material into the tubular member; sensing the operating pressure of the injected fluidic material; and if the operating pressure of the injected fluidic material exceeds a predetermined value, permitting the fluidic material to enter a pressure chamber defined within the tubular member. In an exemplary embodiment, at least a portion of the tubular member has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation. In an exemplary embodiment, the portion of the tubular member includes the pressurized portion of the tubular member.

**[00600]** A method of radially expanding and plastically deforming an expandable tubular member has been described that includes limiting the amount of radial expansion of the expandable tubular member. In an exemplary embodiment, limiting the amount of radial expansion of the expandable tubular member includes: coupling another tubular member to the expandable tubular member that limits the amount of the radial expansion of the expandable tubular member. In an exemplary embodiment, the other tubular member defines one or more slots. In an exemplary embodiment, the other tubular member has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

**[00601]** An apparatus for radially expanding a tubular member has been described that includes an expandable tubular member; an expansion device coupled to the expandable tubular member for radially expanding and plastically deforming the expandable tubular member; and an tubular expansion limiter coupled to the expandable tubular member for limiting the degree to which the expandable tubular member may be radially expanded and plastically deformed. In an exemplary embodiment, the tubular expansion limiter includes a tubular member that defines one or more slots. In an exemplary embodiment, the tubular expansion limiter comprises a tubular member that has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation. In an exemplary embodiment, the apparatus further includes: a locking device positioned within the expandable tubular member releasably coupled to the expandable tubular member; a tubular support member positioned within the expandable tubular member coupled to the locking device and the expansion device. In an exemplary embodiment, at least a portion of the expandable tubular member has a higher

ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation. In an exemplary embodiment, the apparatus further includes: means for transmitting torque between the expandable tubular member and the tubular support member. In an exemplary embodiment, the apparatus further includes: means for sealing the interface between the expandable tubular member and the tubular support member. In an exemplary embodiment, the apparatus further includes means for sealing the interface between the expandable tubular member and the tubular support member. In an exemplary embodiment, the apparatus further includes: means for sensing the operating pressure within the tubular support member. In an exemplary embodiment, the apparatus further includes: means for pressurizing the interior of the tubular support member.

**[00602]** An apparatus for radially expanding a tubular member has been described that includes: an expandable tubular member; an expansion device coupled to the expandable tubular member for radially expanding and plastically deforming the expandable tubular member; an tubular expansion limiter coupled to the expandable tubular member for limiting the degree to which the expandable tubular member may be radially expanded and plastically deformed; a locking device positioned within the expandable tubular member releasably coupled to the expandable tubular member; a tubular support member positioned within the expandable tubular member coupled to the locking device and the expansion device; means for transmitting torque between the expandable tubular member and the tubular support member; means for sealing the interface between the expandable tubular member and the tubular support member; means for sensing the operating pressure within the tubular support member; and means for pressurizing the interior of the tubular support member; wherein at least a portion of the expandable tubular member has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

**[00603]** A method for radially expanding a tubular member has been described that includes positioning a tubular member and an adjustable expansion device within a preexisting structure; radially expanding and plastically deforming at least a portion of the tubular member by pressurizing an interior portion of the tubular member; limiting the extent to which the portion of the tubular member is radially expanded and plastically deformed by pressurizing the interior of the tubular member; increasing the size of the adjustable expansion device; and radially expanding and plastically deforming another portion of the tubular member by displacing the adjustable expansion device relative to the tubular member. In an exemplary embodiment, the method further includes sensing an operating pressure within the tubular member. In an exemplary embodiment, radially expanding and plastically deforming at least a portion of the tubular member by pressurizing an interior

portion of the tubular member includes: injecting fluidic material into the tubular member; sensing the operating pressure of the injected fluidic material; and if the operating pressure of the injected fluidic material exceeds a predetermined value, permitting the fluidic material to enter a pressure chamber defined within the tubular member. In an exemplary embodiment, at least a portion of the tubular member has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation. In an exemplary embodiment, limiting the extent to which the portion of the tubular member is radially expanded and plastically deformed by pressurizing the interior of the tubular member includes: applying a force to the exterior of the tubular member. In an exemplary embodiment, applying a force to the exterior of the tubular member includes: applying a variable force to the exterior of the tubular member.

**[00604]** A system for radially expanding a tubular member has been described that includes means for positioning a tubular member and an adjustable expansion device within a preexisting structure; means for radially expanding and plastically deforming at least a portion of the tubular member by pressurizing an interior portion of the tubular member; means for limiting the extent to which the portion of the tubular member is radially expanded and plastically deformed by pressurizing the interior of the tubular member; means for increasing the size of the adjustable expansion device; and means for radially expanding and plastically deforming another portion of the tubular member by displacing the adjustable expansion device relative to the tubular member. In an exemplary embodiment, the method further includes: means for sensing an operating pressure within the tubular member. In an exemplary embodiment, means for radially expanding and plastically deforming at least a portion of the tubular member by pressurizing an interior portion of the tubular member includes: means for injecting fluidic material into the tubular member; means for sensing the operating pressure of the injected fluidic material; and if the operating pressure of the injected fluidic material exceeds a predetermined value, means for permitting the fluidic material to enter a pressure chamber defined within the tubular member. In an exemplary embodiment, at least a portion of the tubular member has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation. In an exemplary embodiment, means for limiting the extent to which the portion of the tubular member is radially expanded and plastically deformed by pressurizing the interior of the tubular member includes: means for applying a force to the exterior of the tubular member. In an exemplary embodiment, wherein means for applying a force to the exterior of the tubular member includes: means for applying a variable force to the exterior of the tubular member.

**[00605]** An apparatus for radially expanding an expandable tubular member has been described that includes an expandable tubular member; a locking device positioned within

the expandable tubular member releasably coupled to the expandable tubular member; an actuator positioned within the expandable tubular member coupled to the locking device; a tubular support member positioned within the expandable tubular member coupled to the actuator; a first expansion device coupled to the tubular support member; a second expansion device coupled to the tubular support member; and an expandable tubular sleeve coupled to the second expansion device. In an exemplary embodiment, the outside diameters of the first and second expansion devices are unequal. In an exemplary embodiment, the outside diameter of the first expansion device is greater than the outside diameter of the second expansion device. In an exemplary embodiment, at least a portion of the expandable tubular member has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation. In an exemplary embodiment, at least a portion of the expandable tubular sleeve has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation. In an exemplary embodiment, the outside diameters of the first and second expansion devices are both less than or equal to the outside diameter of the expandable tubular member. In an exemplary embodiment, the outside diameter of the expandable tubular sleeve is less than or equal to the outside diameter of the expandable tubular member. In an exemplary embodiment, the apparatus further includes means for transmitting torque between the expandable tubular member and the tubular support member. In an exemplary embodiment, the apparatus further includes means for pressurizing the interior of the tubular support member. In an exemplary embodiment, the apparatus further includes means for limiting axial displacement of the expandable tubular sleeve. In an exemplary embodiment, the apparatus further includes means for limiting axial displacement of the expandable tubular member. In an exemplary embodiment, the apparatus further includes means for transmitting torque from the tubular support member to the means for limiting axial displacement of the expandable tubular sleeve. In an exemplary embodiment, the apparatus further includes means for displacing the first expansion device relative to the expandable tubular member to radially expand and plastically deform the expandable tubular member. In an exemplary embodiment, the apparatus further includes means for displacing the second expansion device relative to the expandable tubular sleeve to radially expand and plastically deform the expandable tubular sleeve. In an exemplary embodiment, the wall thickness of the expandable tubular sleeve is variable. In an exemplary embodiment, the expandable tubular sleeve includes means for sealing an interface between the expandable tubular sleeve and the interior surface of the expandable tubular member.

**[00606]** An apparatus for radially expanding an expandable tubular member has been described that includes: an expandable tubular member; a locking device positioned within

the expandable tubular member releasably coupled to the expandable tubular member; an actuator positioned within the expandable tubular member coupled to the locking device; a tubular support member positioned within the expandable tubular member coupled to the actuator; a first expansion device coupled to the tubular support member; a second expansion device coupled to the tubular support member; an expandable tubular sleeve coupled to the second expansion device; means for transmitting torque between the expandable tubular member and the tubular support member; means for pressurizing the interior of the tubular support member; means for limiting axial displacement of the expandable tubular sleeve; means for limiting axial displacement of the expandable tubular member; means for transmitting torque from the tubular support member to the means for limiting axial displacement of the expandable tubular sleeve; means for displacing the first expansion device relative to the expandable tubular member to radially expand and plastically deform the expandable tubular member; and means for displacing the second expansion device relative to the expandable tubular sleeve to radially expand and plastically deform the expandable tubular sleeve; wherein the outside diameter of the first expansion device is greater than the outside diameter of the second expansion device; wherein at least a portion of the expandable tubular member has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation; wherein at least a portion of the expandable tubular sleeve has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation; wherein the outside diameters of the first and second expansion devices are both less than or equal to the outside diameter of the expandable tubular member; wherein the outside diameter of the expandable tubular sleeve is less than or equal to the outside diameter of the expandable tubular member; wherein the wall thickness of the expandable tubular sleeve is variable; and wherein the expandable tubular sleeve comprises means for sealing an interface between the expandable tubular sleeve and the interior surface of the expandable tubular member.

[00607] A method for radially expanding a tubular member has been described that includes positioning an expandable tubular member and an expandable tubular sleeve within a preexisting structure; radially expanding and plastically deforming at least a portion of the expandable tubular member onto the expandable tubular sleeve; and radially expanding and plastically deforming at least a portion of the expandable tubular sleeve. In an exemplary embodiment, the method further includes radially expanding and plastically deforming at least a portion of the expandable tubular member while simultaneously radially expanding and plastically deforming at least a portion of the expandable tubular sleeve. In an exemplary embodiment, the method further includes radially expanding and plastically deforming another portion of the expandable tubular member after radially expanding and



plastically deforming the portion of the expandable tubular sleeve. In an exemplary embodiment, at least a portion of the expandable tubular member has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation. In an exemplary embodiment, at least a portion of the expandable tubular sleeve has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation. In an exemplary embodiment, the wall thickness of the expandable tubular sleeve is variable. In an exemplary embodiment, the method further includes sealing an interface between the exterior surface of the expandable tubular sleeve and the interior surface of the expandable tubular member.

**[00608]** A system for radially expanding a tubular member has been described that includes means for positioning an expandable tubular member and an expandable tubular sleeve within a preexisting structure; means for radially expanding and plastically deforming at least a portion of the expandable tubular member onto the expandable tubular sleeve; and means for radially expanding and plastically deforming at least a portion of the expandable tubular sleeve. In an exemplary embodiment, the system further includes means for radially expanding and plastically deforming at least a portion of the expandable tubular member while simultaneously radially expanding and plastically deforming at least a portion of the expandable tubular sleeve. In an exemplary embodiment, the system further includes means for radially expanding and plastically deforming another portion of the expandable tubular member after radially expanding and plastically deforming the portion of the expandable tubular sleeve. In an exemplary embodiment, at least a portion of the expandable tubular member has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation. In an exemplary embodiment, at least a portion of the expandable tubular sleeve has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation. In an exemplary embodiment, the wall thickness of the expandable tubular sleeve is variable. In an exemplary embodiment, the system further includes sealing an interface between the exterior surface of the expandable tubular sleeve and the interior surface of the expandable tubular member.

**[00609]** An apparatus for radially expanding an expandable tubular member has been described that includes an expandable tubular member; a locking device positioned within the expandable tubular member releasably coupled to the expandable tubular member; an actuator positioned within the expandable tubular member coupled to the locking device; a tubular support member positioned within the expandable tubular member coupled to the actuator; an adjustable expansion device coupled to the tubular support member; a non-adjustable expansion device coupled to the tubular support member; and an expandable

tubular sleeve coupled to the non-adjustable expansion device. In an exemplary embodiment, at least a portion of the expandable tubular member has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation. In an exemplary embodiment, at least a portion of the expandable tubular sleeve has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation. In an exemplary embodiment, the outside diameters of the adjustable and non-adjustable expansion devices are both less than or equal to the outside diameter of the expandable tubular member. In an exemplary embodiment, the outside diameter of the expandable tubular sleeve is less than or equal to the outside diameter of the expandable tubular member. In an exemplary embodiment, the apparatus further includes means for transmitting torque between the expandable tubular member and the tubular support member. In an exemplary embodiment, the apparatus further includes means for pressurizing the interior of the tubular support member. In an exemplary embodiment, the apparatus further includes means for limiting axial displacement of the expandable tubular sleeve. In an exemplary embodiment, the apparatus further includes means for limiting axial displacement of the expandable tubular member. In an exemplary embodiment, the apparatus further includes means for transmitting torque from the tubular support member to the means for limiting axial displacement of the expandable tubular sleeve. In an exemplary embodiment, the apparatus further includes means for transmitting torque from the tubular support member to the means for limiting axial displacement of the expandable tubular member. In an exemplary embodiment, the apparatus further includes means for displacing the adjustable expansion device relative to the expandable tubular member to radially expand and plastically deform the expandable tubular member. In an exemplary embodiment, the apparatus further includes means for pulling the adjustable expansion device through the expandable tubular member to radially expand and plastically deform the expandable tubular member. In an exemplary embodiment, the apparatus further includes fluid powered means for pulling the adjustable expansion device through the expandable tubular member to radially expand and plastically deform the expandable tubular member. In an exemplary embodiment, the apparatus further includes means for displacing the non-adjustable expansion device relative to the expandable tubular sleeve to radially expand and plastically deform the expandable tubular sleeve. In an exemplary embodiment, the apparatus further includes fluid powered means for pulling the non-adjustable expansion device through the expandable tubular sleeve to radially expand and plastically deform the expandable tubular sleeve. In an exemplary embodiment, the wall thickness of the expandable tubular sleeve is variable. In an exemplary embodiment, the expandable tubular

sleeve includes means for sealing an interface between the expandable tubular sleeve and the interior surface of the expandable tubular member.

**[00610]** An apparatus for radially expanding an expandable tubular member has been described that includes an expandable tubular member; a locking device positioned within the expandable tubular member releasably coupled to the expandable tubular member; an actuator positioned within the expandable tubular member coupled to the locking device; a tubular support member positioned within the expandable tubular member coupled to the actuator; an adjustable expansion device coupled to the tubular support member; a non-adjustable expansion device coupled to the tubular support member; an expandable tubular sleeve coupled to the non-adjustable expansion device; means for transmitting torque between the expandable tubular member and the tubular support member; means for pressurizing the interior of the tubular support member; means for limiting axial displacement of the expandable tubular sleeve; means for limiting axial displacement of the expandable tubular member; means for transmitting torque from the tubular support member to the means for limiting axial displacement of the expandable tubular sleeve; means for transmitting torque from the tubular support member to the means for limiting axial displacement of the expandable tubular member; fluid powered means for pulling the adjustable expansion device through the expandable tubular member to radially expand and plastically deform the expandable tubular member; and fluid powered means for pulling the non-adjustable expansion device through the expandable tubular sleeve to radially expand and plastically deform the expandable tubular sleeve; wherein at least a portion of the expandable tubular member has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation; wherein at least a portion of the expandable tubular sleeve has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation; wherein the outside diameters of the adjustable and non-adjustable expansion devices are both less than or equal to the outside diameter of the expandable tubular member; wherein the outside diameter of the expandable tubular sleeve is less than or equal to the outside diameter of the expandable tubular member; wherein the wall thickness of the expandable tubular sleeve is variable; and wherein the expandable tubular sleeve comprises means for sealing an interface between the expandable tubular sleeve and the interior surface of the expandable tubular member.

**[00611]** A method for radially expanding a tubular member has been described that includes positioning an expandable tubular member, an expandable tubular sleeve, and an adjustable expansion device within a preexisting structure; increasing the size of the adjustable expansion device; radially expanding and plastically deforming at least a portion of the expandable tubular member onto the expandable tubular sleeve using the adjustable

expansion device; and radially expanding and plastically deforming at least a portion of the expandable tubular sleeve. In an exemplary embodiment, the method further includes radially expanding and plastically deforming at least a portion of the expandable tubular member while simultaneously radially expanding and plastically deforming at least a portion of the expandable tubular sleeve. In an exemplary embodiment, the method further includes radially expanding and plastically deforming another portion of the expandable tubular member after radially expanding and plastically deforming the portion of the expandable tubular sleeve. In an exemplary embodiment, at least a portion of the expandable tubular member has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation. In an exemplary embodiment, at least a portion of the expandable tubular sleeve has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation. In an exemplary embodiment, the wall thickness of the expandable tubular sleeve is variable. In an exemplary embodiment, the method further includes sealing an interface between the exterior surface of the expandable tubular sleeve and the interior surface of the expandable tubular member. In an exemplary embodiment, the method further includes pulling the adjustable expansion device through the expandable tubular member. In an exemplary embodiment, the method further includes pulling the adjustable expansion device through the expandable tubular member using fluid pressure.

**[00612]** A system for radially expanding a tubular member has been described that includes means for positioning an expandable tubular member, an expandable tubular sleeve, and an adjustable expansion device within a preexisting structure; means for increasing the size of the adjustable expansion device; means for radially expanding and plastically deforming at least a portion of the expandable tubular member onto the expandable tubular sleeve using the adjustable expansion device; and means for radially expanding and plastically deforming at least a portion of the expandable tubular sleeve. In an exemplary embodiment, the system further includes means for radially expanding and plastically deforming at least a portion of the expandable tubular member while simultaneously radially expanding and plastically deforming at least a portion of the expandable tubular sleeve. In an exemplary embodiment, the system further includes means for radially expanding and plastically deforming another portion of the expandable tubular member after radially expanding and plastically deforming the portion of the expandable tubular sleeve. In an exemplary embodiment, at least a portion of the expandable tubular member has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation. In an exemplary embodiment, at least a portion of the expandable tubular sleeve has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation

than after the radial expansion and plastic deformation. In an exemplary embodiment, the wall thickness of the expandable tubular sleeve is variable. In an exemplary embodiment, the system further includes means for sealing an interface between the exterior surface of the expandable tubular sleeve and the interior surface of the expandable tubular member. In an exemplary embodiment, the system further includes means for pulling the adjustable expansion device through the expandable tubular member. In an exemplary embodiment, the system further includes means for pulling the adjustable expansion device through the expandable tubular member using fluid pressure.

**[00613]** An apparatus for radially expanding an expandable tubular member has been described that includes an expandable tubular member; a locking device positioned within the expandable tubular member releasably coupled to the expandable tubular member; an actuator positioned within the expandable tubular member coupled to the locking device; a tubular support member positioned within the expandable tubular member coupled to the actuator; and an adjustable expansion device positioned within the expandable tubular member coupled to the tubular support member. In an exemplary embodiment, at least a portion of the expandable tubular member has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation. In an exemplary embodiment, the apparatus further includes an expandable tubular sleeve coupled to an end of the expandable tubular member that receives the adjustable expansion device. In an exemplary embodiment, at least a portion of the expandable tubular sleeve has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation. In an exemplary embodiment, the apparatus further includes means for transmitting torque between the expandable tubular member and the tubular support member. In an exemplary embodiment, the apparatus further includes means for pressurizing the interior of the tubular support member. In an exemplary embodiment, the actuator includes means for displacing the adjustable expansion device relative to the expandable tubular member to radially expand and plastically deform the expandable tubular member. In an exemplary embodiment, the actuator further includes means for pulling the adjustable expansion device through the expandable tubular member to radially expand and plastically deform the expandable tubular member. In an exemplary embodiment, the actuator further includes fluid powered means for pulling the adjustable expansion device through the expandable tubular member to radially expand and plastically deform the expandable tubular member. In an exemplary embodiment, the apparatus further includes means for adjusting the size of the adjustable expansion device.

**[00614]** An apparatus for radially expanding an expandable tubular member has been described that includes an expandable tubular member; a locking device positioned within

the expandable tubular member releasably coupled to the expandable tubular member; an actuator positioned within the expandable tubular member coupled to the locking device; a tubular support member positioned within the expandable tubular member coupled to the actuator; an adjustable expansion device positioned within the expandable tubular member coupled to the tubular support member; an expandable tubular sleeve coupled to an end of the expandable tubular member that receives the adjustable expansion device; means for transmitting torque between the expandable tubular member and the tubular support member; means for pressurizing the interior of the tubular support member; means for adjusting the size of the adjustable expansion device; and fluid powered means for pulling the adjustable expansion device through the expandable tubular member to radially expand and plastically deform the expandable tubular member; wherein at least a portion of the expandable tubular member has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation; and wherein at least a portion of the expandable tubular sleeve has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

**[00615]** A method for radially expanding a tubular member has been described that includes positioning an expandable tubular member, an expandable tubular sleeve, and an adjustable expansion device within a preexisting structure; increasing the size of the adjustable expansion device to radially expand and plastically deform at least a portion of at least one of the expandable tubular member and the expandable tubular sleeve; and radially expanding and plastically deforming at least another portion of the expandable tubular member using the adjustable expansion device. In an exemplary embodiment, at least a portion of the expandable tubular member has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation. In an exemplary embodiment, at least a portion of the expandable tubular sleeve has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation. In an exemplary embodiment, the method further includes pulling the adjustable expansion device through the expandable tubular member. In an exemplary embodiment, the method further includes pulling the adjustable expansion device through the expandable tubular member using fluid pressure.

**[00616]** A system for radially expanding a tubular member has been described that includes means for positioning an expandable tubular member, an expandable tubular sleeve, and an adjustable expansion device within a preexisting structure; means for increasing the size of the adjustable expansion device to radially expand and plastically deform at least a portion of at least one of the expandable tubular member and the

expandable tubular sleeve; and means for radially expanding and plastically deforming at least another portion of the expandable tubular member using the adjustable expansion device. In an exemplary embodiment, at least a portion of the expandable tubular member has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation. In an exemplary embodiment, at least a portion of the expandable tubular sleeve has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation. In an exemplary embodiment, the system further includes means for pulling the adjustable expansion device through the expandable tubular member. In an exemplary embodiment, the system further includes means for pulling the adjustable expansion device through the expandable tubular member using fluid pressure.

**[00617]** It is understood that variations may be made in the foregoing without departing from the scope of the invention. For example, the teachings of the present illustrative embodiments may be used to provide a wellbore casing, a pipeline, or a structural support. Furthermore, the elements and teachings of the various illustrative embodiments may be combined in whole or in part in some or all of the illustrative embodiments. In addition, one or more of the elements and teachings of the various illustrative embodiments may be omitted, at least in part, and/or combined, at least in part, with one or more of the other elements and teachings of the various illustrative embodiments.

**[00618]** Although illustrative embodiments of the invention have been shown and described, a wide range of modification, changes and substitution is contemplated in the foregoing disclosure. In some instances, some features of the present invention may be employed without a corresponding use of the other features. Accordingly, it is appropriate that the appended claims be construed broadly and in a manner consistent with the scope of the invention.

What is claimed is:

1. A method of forming a tubular liner within a preexisting structure, comprising:  
positioning a tubular assembly within the preexisting structure; and  
radially expanding and plastically deforming the tubular assembly within the  
preexisting structure;  
wherein, prior to the radial expansion and plastic deformation of the tubular  
assembly, a predetermined portion of the tubular assembly has a lower yield  
point than another portion of the tubular assembly.



2. The method of claim 1, wherein the predetermined portion of the tubular assembly has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.
3. The method of claim 1, wherein the predetermined portion of the tubular assembly has a higher ductility prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.
4. The method of claim 1, wherein the predetermined portion of the tubular assembly has a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.
5. The method of claim 1, wherein the predetermined portion of the tubular assembly has a larger inside diameter after the radial expansion and plastic deformation than other portions of the tubular assembly.
6. The method of claim 5, further comprising:  
positioning another tubular assembly within the preexisting structure in overlapping relation to the tubular assembly; and  
radially expanding and plastically deforming the other tubular assembly within the preexisting structure;  
wherein, prior to the radial expansion and plastic deformation of the tubular assembly, a predetermined portion of the other tubular assembly has a lower yield point than another portion of the other tubular assembly.
7. The method of claim 6, wherein the inside diameter of the radially expanded and plastically deformed other portion of the tubular assembly is equal to the inside diameter of the radially expanded and plastically deformed other portion of the other tubular assembly.
8. The method of claim 1, wherein the predetermined portion of the tubular assembly comprises an end portion of the tubular assembly.
9. The method of claim 1, wherein the predetermined portion of the tubular assembly comprises a plurality of predetermined portions of the tubular assembly.

10. The method of claim 1, wherein the predetermined portion of the tubular assembly comprises a plurality of spaced apart predetermined portions of the tubular assembly.
11. The method of claim 1, wherein the other portion of the tubular assembly comprises an end portion of the tubular assembly.
12. The method of claim 1, wherein the other portion of the tubular assembly comprises a plurality of other portions of the tubular assembly.
13. The method of claim 1, wherein the other portion of the tubular assembly comprises a plurality of spaced apart other portions of the tubular assembly.
14. The method of claim 1, wherein the tubular assembly comprises a plurality of tubular members coupled to one another by corresponding tubular couplings.
15. The method of claim 14, wherein the tubular couplings comprise the predetermined portions of the tubular assembly; and wherein the tubular members comprise the other portion of the tubular assembly.
16. The method of claim 14, wherein one or more of the tubular couplings comprise the predetermined portions of the tubular assembly.
17. The method of claim 14, wherein one or more of the tubular members comprise the predetermined portions of the tubular assembly.
18. The method of claim 1, wherein the predetermined portion of the tubular assembly defines one or more openings.
19. The method of claim 18, wherein one or more of the openings comprise slots.
20. The method of claim 18, wherein the anisotropy for the predetermined portion of the tubular assembly is greater than 1.

21. The method of claim 1, wherein the anisotropy for the predetermined portion of the tubular assembly is greater than 1.
22. The method of claim 1, wherein the strain hardening exponent for the predetermined portion of the tubular assembly is greater than 0.12.
23. The method of claim 1, wherein the anisotropy for the predetermined portion of the tubular assembly is greater than 1; and wherein the strain hardening exponent for the predetermined portion of the tubular assembly is greater than 0.12.
24. The method of claim 1, wherein the predetermined portion of the tubular assembly comprises a first steel alloy comprising: 0.065 % C, 1.44 % Mn, 0.01 % P, 0.002 % S, 0.24 % Si, 0.01 % Cu, 0.01 % Ni, and 0.02 % Cr.
25. The method of claim 24, wherein the yield point of the predetermined portion of the tubular assembly is at most about 46.9 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the tubular assembly is at least about 65.9 ksi after the radial expansion and plastic deformation.
26. The method of claim 24, wherein the yield point of the predetermined portion of the tubular assembly after the radial expansion and plastic deformation is at least about 40 % greater than the yield point of the predetermined portion of the tubular assembly prior to the radial expansion and plastic deformation.
27. The method of claim 24, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is about 1.48.
28. The method of claim 1, wherein the predetermined portion of the tubular assembly comprises a second steel alloy comprising: 0.18 % C, 1.28 % Mn, 0.017 % P, 0.004 % S, 0.29 % Si, 0.01 % Cu, 0.01 % Ni, and 0.03 % Cr.
29. The method of claim 28, wherein the yield point of the predetermined portion of the tubular assembly is at most about 57.8 ksi prior to the radial expansion and plastic

deformation; and wherein the yield point of the predetermined portion of the tubular assembly is at least about 74.4 ksi after the radial expansion and plastic deformation.

30. The method of claim 28, wherein the yield point of the predetermined portion of the tubular assembly after the radial expansion and plastic deformation is at least about 28 % greater than the yield point of the predetermined portion of the tubular assembly prior to the radial expansion and plastic deformation.

31. The method of claim 28, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is about 1.04.

32. The method of claim 1, wherein the predetermined portion of the tubular assembly comprises a third steel alloy comprising: 0.08 % C, 0.82 % Mn, 0.006 % P, 0.003 % S, 0.30 % Si, 0.16 % Cu, 0.05 % Ni, and 0.05 % Cr.

33. The method of claim 32, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is about 1.92.

34. The method of claim 1, wherein the predetermined portion of the tubular assembly comprises a fourth steel alloy comprising: 0.02 % C, 1.31 % Mn, 0.02 % P, 0.001 % S, 0.45 % Si, 9.1 % Ni, and 18.7 % Cr.

35. The method of claim 34, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is about 1.34.

36. The method of claim 1, wherein the yield point of the predetermined portion of the tubular assembly is at most about 46.9 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the tubular assembly is at least about 65.9 ksi after the radial expansion and plastic deformation.

37. The method of claim 1, wherein the yield point of the predetermined portion of the tubular assembly after the radial expansion and plastic deformation is at least about 40 % greater than the yield point of the predetermined portion of the tubular assembly prior to the radial expansion and plastic deformation.

38. The method of claim 1, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is at least about 1.48.
39. The method of claim 1, wherein the yield point of the predetermined portion of the tubular assembly is at most about 57.8 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the tubular assembly is at least about 74.4 ksi after the radial expansion and plastic deformation.
40. The method of claim 1, wherein the yield point of the predetermined portion of the tubular assembly after the radial expansion and plastic deformation is at least about 28 % greater than the yield point of the predetermined portion of the tubular assembly prior to the radial expansion and plastic deformation.
41. The method of claim 1, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is at least about 1.04.
42. The method of claim 1, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is at least about 1.92.
43. The method of claim 1, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is at least about 1.34.
44. The method of claim 1, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, ranges from about 1.04 to about 1.92.
45. The method of claim 1, wherein the yield point of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, ranges from about 47.6 ksi to about 61.7 ksi.

46. The method of claim 1, wherein the expandability coefficient of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is greater than 0.12.
47. The method of claim 1, wherein the expandability coefficient of the predetermined portion of the tubular assembly is greater than the expandability coefficient of the other portion of the tubular assembly.
48. The method of claim 1, wherein the tubular assembly comprises a wellbore casing.
49. The method of claim 1, wherein the tubular assembly comprises a pipeline.
50. The method of claim 1, wherein the tubular assembly comprises a structural support.
51. An expandable tubular member comprising a steel alloy comprising: 0.065 % C, 1.44 % Mn, 0.01 % P, 0.002 % S, 0.24 % Si, 0.01 % Cu, 0.01 % Ni, and 0.02 % Cr.
52. The tubular member of claim 51, wherein a yield point of the tubular member is at most about 46.9 ksi prior to a radial expansion and plastic deformation; and wherein a yield point of the tubular member is at least about 65.9 ksi after the radial expansion and plastic deformation.
53. The tubular member of claim 51, wherein the yield point of the tubular member after the radial expansion and plastic deformation is at least about 40 % greater than the yield point of the tubular member prior to the radial expansion and plastic deformation.
54. The tubular member of claim 51, wherein the anisotropy of the tubular member, prior to a radial expansion and plastic deformation, is about 1.48.
55. The tubular member of claim 51, wherein the tubular member comprises a wellbore casing.
56. The tubular member of claim 51, wherein the tubular member comprises a pipeline.

57. The tubular member of claim 51, wherein the tubular member comprises a structural support.

58. An expandable tubular member comprising a steel alloy comprising: 0.18 % C, 1.28 % Mn, 0.017 % P, 0.004 % S, 0.29 % Si, 0.01 % Cu, 0.01 % Ni, and 0.03 % Cr.

59. The tubular member of claim 58, wherein a yield point of the tubular member is at most about 57.8 ksi prior to a radial expansion and plastic deformation; and wherein the yield point of the tubular member is at least about 74.4 ksi after the radial expansion and plastic deformation.

60. The tubular member of claim 58, wherein a yield point of the of the tubular member after a radial expansion and plastic deformation is at least about 28 % greater than the yield point of the tubular member prior to the radial expansion and plastic deformation.

61. The tubular member of claim 58, wherein the anisotropy of the tubular member, prior to a radial expansion and plastic deformation, is about 1.04.

62. The tubular member of claim 58, wherein the tubular member comprises a wellbore casing.

63. The tubular member of claim 58, wherein the tubular member comprises a pipeline.

64. The tubular member of claim 58, wherein the tubular member comprises a structural support.

65. An expandable tubular member comprising a steel alloy comprising: 0.08 % C, 0.82 % Mn, 0.006 % P, 0.003 % S, 0.30 % Si, 0.16 % Cu, 0.05 % Ni, and 0.05 % Cr.

66. The tubular member of claim 65, wherein the anisotropy of the tubular member, prior to a radial expansion and plastic deformation, is about 1.92.

67. The tubular member of claim 65, wherein the tubular member comprises a wellbore casing.
68. The tubular member of claim 65, wherein the tubular member comprises a pipeline.
69. The tubular member of claim 65, wherein the tubular member comprises a structural support.
70. An expandable tubular member comprising a steel alloy comprising: 0.02 % C, 1.31 % Mn, 0.02 % P, 0.001 % S, 0.45 % Si, 9.1 % Ni, and 18.7 % Cr.
71. The tubular member of claim 70, wherein the anisotropy of the tubular member, prior to a radial expansion and plastic deformation, is about 1.34.
72. The tubular member of claim 70, wherein the tubular member comprises a wellbore casing.
73. The tubular member of claim 70, wherein the tubular member comprises a pipeline.
74. The tubular member of claim 70, wherein the tubular member comprises a structural support.
75. An expandable tubular member, wherein the yield point of the expandable tubular member is at most about 46.9 ksi prior to a radial expansion and plastic deformation; and wherein the yield point of the expandable tubular member is at least about 65.9 ksi after the radial expansion and plastic deformation.
76. The tubular member of claim 75, wherein the tubular member comprises a wellbore casing.
77. The tubular member of claim 75, wherein the tubular member comprises a pipeline.
78. The tubular member of claim 75, wherein the tubular member comprises a structural support.



79. An expandable tubular member, wherein a yield point of the expandable tubular member after a radial expansion and plastic deformation is at least about 40 % greater than the yield point of the expandable tubular member prior to the radial expansion and plastic deformation.
80. The tubular member of claim 79, wherein the tubular member comprises a wellbore casing.
81. The tubular member of claim 79, wherein the tubular member comprises a pipeline.
82. The tubular member of claim 79, wherein the tubular member comprises a structural support.
83. An expandable tubular member, wherein the anisotropy of the expandable tubular member, prior to the radial expansion and plastic deformation, is at least about 1.48.
84. The tubular member of claim 83, wherein the tubular member comprises a wellbore casing.
85. The tubular member of claim 83, wherein the tubular member comprises a pipeline.
86. The tubular member of claim 83, wherein the tubular member comprises a structural support.
87. An expandable tubular member, wherein the yield point of the expandable tubular member is at most about 57.8 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the expandable tubular member is at least about 74.4 ksi after the radial expansion and plastic deformation.
88. The tubular member of claim 87, wherein the tubular member comprises a wellbore casing.
89. The tubular member of claim 87, wherein the tubular member comprises a pipeline.

90. The tubular member of claim 87, wherein the tubular member comprises a structural support.

91. An expandable tubular member, wherein the yield point of the expandable tubular member after a radial expansion and plastic deformation is at least about 28 % greater than the yield point of the expandable tubular member prior to the radial expansion and plastic deformation.

92. The tubular member of claim 91, wherein the tubular member comprises a wellbore casing.

93. The tubular member of claim 91, wherein the tubular member comprises a pipeline.

94. The tubular member of claim 91, wherein the tubular member comprises a structural support.

95. An expandable tubular member, wherein the anisotropy of the expandable tubular member, prior to the radial expansion and plastic deformation, is at least about 1.04.

96. The tubular member of claim 95, wherein the tubular member comprises a wellbore casing.

97. The tubular member of claim 95, wherein the tubular member comprises a pipeline.

98. The tubular member of claim 95, wherein the tubular member comprises a structural support.

99. An expandable tubular member, wherein the anisotropy of the expandable tubular member, prior to the radial expansion and plastic deformation, is at least about 1.92.

100. The tubular member of claim 99, wherein the tubular member comprises a wellbore casing.

101. The tubular member of claim 99, wherein the tubular member comprises a pipeline.
102. The tubular member of claim 99, wherein the tubular member comprises a structural support.
103. An expandable tubular member, wherein the anisotropy of the expandable tubular member, prior to the radial expansion and plastic deformation, is at least about 1.34.
104. The tubular member of claim 103, wherein the tubular member comprises a wellbore casing.
105. The tubular member of claim 103, wherein the tubular member comprises a pipeline.
106. The tubular member of claim 103, wherein the tubular member comprises a structural support.
107. An expandable tubular member, wherein the anisotropy of the expandable tubular member, prior to the radial expansion and plastic deformation, ranges from about 1.04 to about 1.92.
108. The tubular member of claim 107, wherein the tubular member comprises a wellbore casing.
109. The tubular member of claim 107, wherein the tubular member comprises a pipeline.
110. The tubular member of claim 107, wherein the tubular member comprises a structural support.
111. An expandable tubular member, wherein the yield point of the expandable tubular member, prior to the radial expansion and plastic deformation, ranges from about 47.8 ksi to about 61.7 ksi.
112. The tubular member of claim 111, wherein the tubular member comprises a wellbore casing.

113. The tubular member of claim 111, wherein the tubular member comprises a pipeline.
114. The tubular member of claim 111, wherein the tubular member comprises a structural support.
115. An expandable tubular member, wherein the expandability coefficient of the expandable tubular member, prior to the radial expansion and plastic deformation, is greater than 0.12.
116. The tubular member of claim 115, wherein the tubular member comprises a wellbore casing.
117. The tubular member of claim 115, wherein the tubular member comprises a pipeline.
118. The tubular member of claim 115, wherein the tubular member comprises a structural support.
119. An expandable tubular member, wherein the expandability coefficient of the expandable tubular member is greater than the expandability coefficient of another portion of the expandable tubular member.
120. The tubular member of claim 119, wherein the tubular member comprises a wellbore casing.
121. The tubular member of claim 119, wherein the tubular member comprises a pipeline.
122. The tubular member of claim 119, wherein the tubular member comprises a structural support.
123. An expandable tubular member, wherein the tubular member has a higher ductility and a lower yield point prior to a radial expansion and plastic deformation than after the radial expansion and plastic deformation.

124. The tubular member of claim 123, wherein the tubular member comprises a wellbore casing.
125. The tubular member of claim 123, wherein the tubular member comprises a pipeline.
126. The tubular member of claim 123, wherein the tubular member comprises a structural support.
127. A method of radially expanding and plastically deforming a tubular assembly comprising a first tubular member coupled to a second tubular member, comprising:  
radially expanding and plastically deforming the tubular assembly within a preexisting structure; and  
using less power to radially expand each unit length of the first tubular member than to radially expand each unit length of the second tubular member.
128. The method of claim 127, wherein the tubular member comprises a wellbore casing.
129. The method of claim 127, wherein the tubular member comprises a pipeline.
130. The method of claim 127, wherein the tubular member comprises a structural support.
131. A system for radially expanding and plastically deforming a tubular assembly comprising a first tubular member coupled to a second tubular member, comprising:  
means for radially expanding the tubular assembly within a preexisting structure; and  
means for using less power to radially expand each unit length of the first tubular member than to radially expand each unit length of the second tubular member.
132. The system of claim 131, wherein the tubular member comprises a wellbore casing.
133. The system of claim 131, wherein the tubular member comprises a pipeline.

134. The system of claim 131, wherein the tubular member comprises a structural support.
135. A method of manufacturing a tubular member, comprising:  
processing a tubular member until the tubular member is characterized by one or more intermediate characteristics;  
positioning the tubular member within a preexisting structure; and  
processing the tubular member within the preexisting structure until the tubular member is characterized one or more final characteristics.
136. The method of claim 135, wherein the tubular member comprises a wellbore casing.
137. The method of claim 135, wherein the tubular member comprises a pipeline.
138. The method of claim 135, wherein the tubular member comprises a structural support.
139. The method of claim 135, wherein the preexisting structure comprises a wellbore that traverses a subterranean formation.
140. The method of claim 135, wherein the characteristics are selected from a group consisting of yield point and ductility.
141. The method of claim 135, wherein processing the tubular member within the preexisting structure until the tubular member is characterized one or more final characteristics comprises:  
radially expanding and plastically deforming the tubular member within the preexisting structure.
142. An apparatus, comprising:  
an expandable tubular assembly; and  
an expansion device coupled to the expandable tubular assembly;  
wherein a predetermined portion of the expandable tubular assembly has a lower yield point than another portion of the expandable tubular assembly.

143. The apparatus of claim 142, wherein the expansion device comprises a rotary expansion device.
144. The apparatus of claim 142, wherein the expansion device comprises an axially displaceable expansion device.
145. The apparatus of claim 142, wherein the expansion device comprises a reciprocating expansion device.
146. The apparatus of claim 142, wherein the expansion device comprises a hydroforming expansion device.
147. The apparatus of claim 142, wherein the expansion device comprises an impulsive force expansion device.
148. The apparatus of claim 142, wherein the predetermined portion of the tubular assembly has a higher ductility and a lower yield point than another portion of the expandable tubular assembly.
149. The apparatus of claim 142, wherein the predetermined portion of the tubular assembly has a higher ductility than another portion of the expandable tubular assembly.
150. The apparatus of claim 142, wherein the predetermined portion of the tubular assembly has a lower yield point than another portion of the expandable tubular assembly.
151. The apparatus of claim 142, wherein the predetermined portion of the tubular assembly comprises an end portion of the tubular assembly.
152. The apparatus of claim 142, wherein the predetermined portion of the tubular assembly comprises a plurality of predetermined portions of the tubular assembly.

153. The apparatus of claim 142, wherein the predetermined portion of the tubular assembly comprises a plurality of spaced apart predetermined portions of the tubular assembly.

154. The apparatus of claim 142, wherein the other portion of the tubular assembly comprises an end portion of the tubular assembly.

155. The apparatus of claim 142, wherein the other portion of the tubular assembly comprises a plurality of other portions of the tubular assembly.

156. The apparatus of claim 142, wherein the other portion of the tubular assembly comprises a plurality of spaced apart other portions of the tubular assembly.

157. The apparatus of claim 142, wherein the tubular assembly comprises a plurality of tubular members coupled to one another by corresponding tubular couplings.

158. The apparatus of claim 157, wherein the tubular couplings comprise the predetermined portions of the tubular assembly; and wherein the tubular members comprise the other portion of the tubular assembly.

159. The apparatus of claim 157, wherein one or more of the tubular couplings comprise the predetermined portions of the tubular assembly.

160. The apparatus of claim 157, wherein one or more of the tubular members comprise the predetermined portions of the tubular assembly.

161. The apparatus of claim 142, wherein the predetermined portion of the tubular assembly defines one or more openings.

162. The apparatus of claim 161, wherein one or more of the openings comprise slots.

163. The apparatus of claim 161, wherein the anisotropy for the predetermined portion of the tubular assembly is greater than 1.



164. The apparatus of claim 142, wherein the anisotropy for the predetermined portion of the tubular assembly is greater than 1.

165. The apparatus of claim 142, wherein the strain hardening exponent for the predetermined portion of the tubular assembly is greater than 0.12.

166. The apparatus of claim 142, wherein the anisotropy for the predetermined portion of the tubular assembly is greater than 1; and wherein the strain hardening exponent for the predetermined portion of the tubular assembly is greater than 0.12.

167. The apparatus of claim 142, wherein the predetermined portion of the tubular assembly comprises a first steel alloy comprising: 0.065 % C, 1.44 % Mn, 0.01 % P, 0.002 % S, 0.24 % Si, 0.01 % Cu, 0.01 % Ni, and 0.02 % Cr.

168. The apparatus of claim 167, wherein the yield point of the predetermined portion of the tubular assembly is at most about 46.9 ksi.

169. The apparatus of claim 167, wherein the anisotropy of the predetermined portion of the tubular assembly is about 1.48.

170. The apparatus of claim 142, wherein the predetermined portion of the tubular assembly comprises a second steel alloy comprising: 0.18 % C, 1.28 % Mn, 0.017 % P, 0.004 % S, 0.29 % Si, 0.01 % Cu, 0.01 % Ni, and 0.03 % Cr.

171. The apparatus of claim 170, wherein the yield point of the predetermined portion of the tubular assembly is at most about 57.8 ksi.

172. The apparatus of claim 170, wherein the anisotropy of the predetermined portion of the tubular assembly is about 1.04.

173. The apparatus of claim 142, wherein the predetermined portion of the tubular assembly comprises a third steel alloy comprising: 0.08 % C, 0.82 % Mn, 0.006 % P, 0.003 % S, 0.30 % Si, 0.16 % Cu, 0.05 % Ni, and 0.05 % Cr.

174. The apparatus of claim 173, wherein the anisotropy of the predetermined portion of the tubular assembly is about 1.92.

175. The apparatus of claim 142, wherein the predetermined portion of the tubular assembly comprises a fourth steel alloy comprising: 0.02 % C, 1.31 % Mn, 0.02 % P, 0.001 % S, 0.45 % Si, 9.1 % Ni, and 18.7 % Cr.

176. The apparatus of claim 175, wherein the anisotropy of the predetermined portion of the tubular assembly is at least about 1.34.

177. The apparatus of claim 142, wherein the yield point of the predetermined portion of the tubular assembly is at most about 46.9 ksi.

178. The apparatus of claim 142; wherein the anisotropy of the predetermined portion of the tubular assembly is at least about 1.48.

179. The apparatus of claim 142, wherein the yield point of the predetermined portion of the tubular assembly is at most about 57.8 ksi.

180. The apparatus of claim 142, wherein the anisotropy of the predetermined portion of the tubular assembly is at least about 1.04.

181. The apparatus of claim 142, wherein the anisotropy of the predetermined portion of the tubular assembly is at least about 1.92.

182. The apparatus of claim 142, wherein the anisotropy of the predetermined portion of the tubular assembly is at least about 1.34.

183. The apparatus of claim 142, wherein the anisotropy of the predetermined portion of the tubular assembly ranges from about 1.04 to about 1.92.

184. The apparatus of claim 142, wherein the yield point of the predetermined portion of the tubular assembly ranges from about 47.6 ksi to about 61.7 ksi.

185. The apparatus of claim 142, wherein the expandability coefficient of the predetermined portion of the tubular assembly is greater than 0.12.
186. The apparatus of claim 142, wherein the expandability coefficient of the predetermined portion of the tubular assembly is greater than the expandability coefficient of the other portion of the tubular assembly.
187. The apparatus of claim 142, wherein the tubular assembly comprises a wellbore casing.
188. The apparatus of claim 142, wherein the tubular assembly comprises a pipeline.
189. The apparatus of claim 142, wherein the tubular assembly comprises a structural support.
190. An expandable tubular member, wherein a yield point of the expandable tubular member after a radial expansion and plastic deformation is at least about 5.8 % greater than the yield point of the expandable tubular member prior to the radial expansion and plastic deformation.
191. The tubular member of claim 190, wherein the tubular member comprises a wellbore casing.
192. The tubular member of claim 190, wherein the tubular member comprises a pipeline.
193. The tubular member of claim 190, wherein the tubular member comprises a structural support.
194. A method of determining the expandability of a selected tubular member, comprising:  
determining an anisotropy value for the selected tubular member;  
determining a strain hardening value for the selected tubular member; and  
multiplying the anisotropy value times the strain hardening value to generate an expandability value for the selected tubular member.

195. The method of claim 194, wherein an anisotropy value greater than 0.12 indicates that the tubular member is suitable for radial expansion and plastic deformation.
196. The method of claim 194, wherein the tubular member comprises a wellbore casing.
197. The method of claim 194, wherein the tubular member comprises a pipeline.
198. The method of claim 194, wherein the tubular member comprises a structural support.
199. A method of radially expanding and plastically deforming tubular members, comprising:  
selecting a tubular member;  
determining an anisotropy value for the selected tubular member;  
determining a strain hardening value for the selected tubular member;  
multiplying the anisotropy value times the strain hardening value to generate an expandability value for the selected tubular member; and  
if the anisotropy value is greater than 0.12, then radially expanding and plastically deforming the selected tubular member.
200. The method of claim 199, wherein the tubular member comprises a wellbore casing.
201. The method of claim 199, wherein the tubular member comprises a pipeline.
202. The method of claim 199, wherein the tubular member comprises a structural support.
203. The method of claim 199, wherein radially expanding and plastically deforming the selected tubular member comprises:  
inserting the selected tubular member into a preexisting structure; and  
then radially expanding and plastically deforming the selected tubular member.
204. The method of claim 203, wherein the preexisting structure comprises a wellbore that traverses a subterranean formation.

205. A radially expandable tubular member apparatus comprising:  
a first tubular member;  
a second tubular member engaged with the first tubular member forming a joint; and  
a sleeve overlapping and coupling the first and second tubular members at the joint;  
wherein, prior to a radial expansion and plastic deformation of the apparatus, a  
predetermined portion of the apparatus has a lower yield point than another  
portion of the apparatus.
206. The apparatus of claim 205, wherein the predetermined portion of the apparatus has  
a higher ductility and a lower yield point prior to the radial expansion and plastic deformation  
than after the radial expansion and plastic deformation.
207. The apparatus of claim 205, wherein the predetermined portion of the apparatus has  
a higher ductility prior to the radial expansion and plastic deformation than after the radial  
expansion and plastic deformation.
208. The apparatus of claim 205, wherein the predetermined portion of the apparatus has  
a lower yield point prior to the radial expansion and plastic deformation than after the radial  
expansion and plastic deformation.
209. The apparatus of claim 205, wherein the predetermined portion of the apparatus has  
a larger inside diameter after the radial expansion and plastic deformation than other  
portions of the tubular assembly.
210. The apparatus of claim 209, further comprising:  
positioning another apparatus within the preexisting structure in overlapping relation  
to the apparatus; and  
radially expanding and plastically deforming the other apparatus within the  
preexisting structure;  
wherein, prior to the radial expansion and plastic deformation of the apparatus, a  
predetermined portion of the other apparatus has a lower yield point than  
another portion of the other apparatus.

211. The apparatus of claim 210, wherein the inside diameter of the radially expanded and plastically deformed other portion of the apparatus is equal to the inside diameter of the radially expanded and plastically deformed other portion of the other apparatus.

212. The apparatus of claim 205, wherein the predetermined portion of the apparatus comprises an end portion of the apparatus.

213. The apparatus of claim 205, wherein the predetermined portion of the apparatus comprises a plurality of predetermined portions of the apparatus.

214. The apparatus of claim 205, wherein the predetermined portion of the apparatus comprises a plurality of spaced apart predetermined portions of the apparatus.

215. The apparatus of claim 205, wherein the other portion of the apparatus comprises an end portion of the apparatus.

216. The apparatus of claim 205, wherein the other portion of the apparatus comprises a plurality of other portions of the apparatus.

217. The apparatus of claim 205, wherein the other portion of the apparatus comprises a plurality of spaced apart other portions of the apparatus.

218. The apparatus of claim 205, wherein the apparatus comprises a plurality of tubular members coupled to one another by corresponding tubular couplings.

219. The apparatus of claim 218, wherein the tubular couplings comprise the predetermined portions of the apparatus; and wherein the tubular members comprise the other portion of the apparatus.

220. The apparatus of claim 218, wherein one or more of the tubular couplings comprise the predetermined portions of the apparatus.

221. The apparatus of claim 218, wherein one or more of the tubular members comprise the predetermined portions of the apparatus.

222. The apparatus of claim 205, wherein the predetermined portion of the apparatus defines one or more openings.
223. The apparatus of claim 222, wherein one or more of the openings comprise slots.
224. The apparatus of claim 222, wherein the anisotropy for the predetermined portion of the apparatus is greater than 1.
225. The apparatus of claim 205, wherein the anisotropy for the predetermined portion of the apparatus is greater than 1.
226. The apparatus of claim 205, wherein the strain hardening exponent for the predetermined portion of the apparatus is greater than 0.12.
227. The apparatus of claim 205, wherein the anisotropy for the predetermined portion of the apparatus is greater than 1; and wherein the strain hardening exponent for the predetermined portion of the apparatus is greater than 0.12.
228. The apparatus of claim 205, wherein the predetermined portion of the apparatus comprises a first steel alloy comprising: 0.065 % C, 1.44 % Mn, 0.01 % P, 0.002 % S, 0.24 % Si, 0.01 % Cu, 0.01 % Ni, and 0.02 % Cr.
229. The apparatus of claim 228, wherein the yield point of the predetermined portion of the apparatus is at most about 46.9 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the apparatus is at least about 65.9 ksi after the radial expansion and plastic deformation.
230. The apparatus of claim 228, wherein the yield point of the predetermined portion of the apparatus after the radial expansion and plastic deformation is at least about 40 % greater than the yield point of the predetermined portion of the apparatus prior to the radial expansion and plastic deformation.

231. The apparatus of claim 228, wherein the anisotropy of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, is about 1.48.

232. The apparatus of claim 205, wherein the predetermined portion of the apparatus comprises a second steel alloy comprising: 0.18 % C, 1.28 % Mn, 0.017 % P, 0.004 % S, 0.29 % Si, 0.01 % Cu, 0.01 % Ni, and 0.03 % Cr.

233. The apparatus of claim 232, wherein the yield point of the predetermined portion of the apparatus is at most about 57.8 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the apparatus is at least about 74.4 ksi after the radial expansion and plastic deformation.

234. The apparatus of claim 232, wherein the yield point of the predetermined portion of the apparatus after the radial expansion and plastic deformation is at least about 28 % greater than the yield point of the predetermined portion of the apparatus prior to the radial expansion and plastic deformation.

235. The apparatus of claim 232, wherein the anisotropy of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, is about 1.04.

236. The apparatus of claim 205, wherein the predetermined portion of the apparatus comprises a third steel alloy comprising: 0.08 % C, 0.82 % Mn, 0.006 % P, 0.003 % S, 0.30 % Si, 0.16 % Cu, 0.05 % Ni, and 0.05 % Cr.

237. The apparatus of claim 236, wherein the anisotropy of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, is about 1.92.

238. The apparatus of claim 205, wherein the predetermined portion of the apparatus comprises a fourth steel alloy comprising: 0.02 % C, 1.31 % Mn, 0.02 % P, 0.001 % S, 0.45 % Si, 9.1 % Ni, and 18.7 % Cr.

239. The apparatus of claim 238, wherein the anisotropy of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, is about 1.34.



240. The apparatus of claim 205, wherein the yield point of the predetermined portion of the apparatus is at most about 46.9 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the apparatus is at least about 65.9 ksi after the radial expansion and plastic deformation.

241. The apparatus of claim 205, wherein the yield point of the predetermined portion of the apparatus after the radial expansion and plastic deformation is at least about 40 % greater than the yield point of the predetermined portion of the apparatus prior to the radial expansion and plastic deformation.

242. The apparatus of claim 205, wherein the anisotropy of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, is at least about 1.48.

243. The apparatus of claim 205, wherein the yield point of the predetermined portion of the apparatus is at most about 57.8 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the apparatus is at least about 74.4 ksi after the radial expansion and plastic deformation.

244. The apparatus of claim 205, wherein the yield point of the predetermined portion of the apparatus after the radial expansion and plastic deformation is at least about 28 % greater than the yield point of the predetermined portion of the apparatus prior to the radial expansion and plastic deformation.

245. The apparatus of claim 205, wherein the anisotropy of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, is at least about 1.04.

246. The apparatus of claim 205, wherein the anisotropy of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, is at least about 1.92.

247. The apparatus of claim 205, wherein the anisotropy of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, is at least about 1.34.

248. The apparatus of claim 205, wherein the anisotropy of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, ranges from about 1.04 to about 1.92.

249. The apparatus of claim 205, wherein the yield point of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, ranges from about 47.6 ksi to about 61.7 ksi.

250. The apparatus of claim 205, wherein the expandability coefficient of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, is greater than 0.12.

251. The apparatus of claim 205, wherein the expandability coefficient of the predetermined portion of the apparatus is greater than the expandability coefficient of the other portion of the apparatus.

252. The apparatus of claim 205, wherein the apparatus comprises a wellbore casing.

253. The apparatus of claim 205, wherein the apparatus comprises a pipeline.

254. The apparatus of claim 205, wherein the apparatus comprises a structural support.

255. A radially expandable tubular member apparatus comprising:  
a first tubular member;  
a second tubular member engaged with the first tubular member forming a joint;  
a sleeve overlapping and coupling the first and second tubular members at the joint;  
the sleeve having opposite tapered ends and a flange engaged in a recess formed in  
an adjacent tubular member; and  
one of the tapered ends being a surface formed on the flange;  
wherein, prior to a radial expansion and plastic deformation of the apparatus, a  
predetermined portion of the apparatus has a lower yield point than another  
portion of the apparatus.

256. The apparatus as defined in claim 255 wherein the recess includes a tapered wall in mating engagement with the tapered end formed on the flange.
257. The apparatus as defined in claim 255 wherein the sleeve includes a flange at each tapered end and each tapered end is formed on a respective flange.
258. The apparatus as defined in claim 257 wherein each tubular member includes a recess.
259. The apparatus as defined in claim 258 wherein each flange is engaged in a respective one of the recesses.
260. The apparatus as defined in claim 259 wherein each recess includes a tapered wall in mating engagement with the tapered end formed on a respective one of the flanges.
261. The apparatus of claim 255, wherein the predetermined portion of the apparatus has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.
262. The apparatus of claim 255, wherein the predetermined portion of the apparatus has a higher ductility prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.
263. The apparatus of claim 255, wherein the predetermined portion of the apparatus has a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.
264. The apparatus of claim 255, wherein the predetermined portion of the apparatus has a larger inside diameter after the radial expansion and plastic deformation than other portions of the tubular assembly.
265. The apparatus of claim 264, further comprising:

positioning another apparatus within the preexisting structure in overlapping relation to the apparatus; and  
radially expanding and plastically deforming the other apparatus within the preexisting structure;  
wherein, prior to the radial expansion and plastic deformation of the apparatus, a predetermined portion of the other apparatus has a lower yield point than another portion of the other apparatus.

266. The apparatus of claim 265, wherein the inside diameter of the radially expanded and plastically deformed other portion of the apparatus is equal to the inside diameter of the radially expanded and plastically deformed other portion of the other apparatus.

267. The apparatus of claim 255, wherein the predetermined portion of the apparatus comprises an end portion of the apparatus.

268. The apparatus of claim 255, wherein the predetermined portion of the apparatus comprises a plurality of predetermined portions of the apparatus.

269. The apparatus of claim 255, wherein the predetermined portion of the apparatus comprises a plurality of spaced apart predetermined portions of the apparatus.

270. The apparatus of claim 255, wherein the other portion of the apparatus comprises an end portion of the apparatus.

271. The apparatus of claim 255, wherein the other portion of the apparatus comprises a plurality of other portions of the apparatus.

272. The apparatus of claim 255, wherein the other portion of the apparatus comprises a plurality of spaced apart other portions of the apparatus.

273. The apparatus of claim 255, wherein the apparatus comprises a plurality of tubular members coupled to one another by corresponding tubular couplings.

274. The apparatus of claim 273, wherein the tubular couplings comprise the predetermined portions of the apparatus; and wherein the tubular members comprise the other portion of the apparatus.
275. The apparatus of claim 273, wherein one or more of the tubular couplings comprise the predetermined portions of the apparatus.
276. The apparatus of claim 273, wherein one or more of the tubular members comprise the predetermined portions of the apparatus.
277. The apparatus of claim 255, wherein the predetermined portion of the apparatus defines one or more openings.
278. The apparatus of claim 277, wherein one or more of the openings comprise slots.
279. The apparatus of claim 277, wherein the anisotropy for the predetermined portion of the apparatus is greater than 1.
280. The apparatus of claim 255, wherein the anisotropy for the predetermined portion of the apparatus is greater than 1.
281. The apparatus of claim 255, wherein the strain hardening exponent for the predetermined portion of the apparatus is greater than 0.12.
282. The apparatus of claim 255, wherein the anisotropy for the predetermined portion of the apparatus is greater than 1; and wherein the strain hardening exponent for the predetermined portion of the apparatus is greater than 0.12.
283. The apparatus of claim 255, wherein the predetermined portion of the apparatus comprises a first steel alloy comprising: 0.065 % C, 1.44 % Mn, 0.01 % P, 0.002 % S, 0.24 % Si, 0.01 % Cu, 0.01 % Ni, and 0.02 % Cr.
284. The apparatus of claim 283, wherein the yield point of the predetermined portion of the apparatus is at most about 46.9 ksi prior to the radial expansion and plastic deformation;

and wherein the yield point of the predetermined portion of the apparatus is at least about 65.9 ksi after the radial expansion and plastic deformation.

285. The apparatus of claim 283, wherein the yield point of the predetermined portion of the apparatus after the radial expansion and plastic deformation is at least about 40 % greater than the yield point of the predetermined portion of the apparatus prior to the radial expansion and plastic deformation.

286. The apparatus of claim 283, wherein the anisotropy of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, is about 1.48.

287. The apparatus of claim 255, wherein the predetermined portion of the apparatus comprises a second steel alloy comprising: 0.18 % C, 1.28 % Mn, 0.017 % P, 0.004 % S, 0.29 % Si, 0.01 % Cu, 0.01 % Ni, and 0.03 % Cr.

288. The apparatus of claim 287, wherein the yield point of the predetermined portion of the apparatus is at most about 57.8 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the apparatus is at least about 74.4 ksi after the radial expansion and plastic deformation.

289. The apparatus of claim 287, wherein the yield point of the predetermined portion of the apparatus after the radial expansion and plastic deformation is at least about 28 % greater than the yield point of the predetermined portion of the apparatus prior to the radial expansion and plastic deformation.

290. The apparatus of claim 287, wherein the anisotropy of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, is about 1.04.

291. The apparatus of claim 255, wherein the predetermined portion of the apparatus comprises a third steel alloy comprising: 0.08 % C, 0.82 % Mn, 0.006 % P, 0.003 % S, 0.30 % Si, 0.16 % Cu, 0.05 % Ni, and 0.05 % Cr.

292. The apparatus of claim 291, wherein the anisotropy of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, is about 1.92.

293. The apparatus of claim 255, wherein the predetermined portion of the apparatus comprises a fourth steel alloy comprising: 0.02 % C, 1.31 % Mn, 0.02 % P, 0.001 % S, 0.45 % Si, 9.1 % Ni, and 18.7 % Cr.

294. The apparatus of claim 293, wherein the anisotropy of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, is about 1.34.

295. The apparatus of claim 255, wherein the yield point of the predetermined portion of the apparatus is at most about 46.9 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the apparatus is at least about 65.9 ksi after the radial expansion and plastic deformation.

296. The apparatus of claim 255, wherein the yield point of the predetermined portion of the apparatus after the radial expansion and plastic deformation is at least about 40 % greater than the yield point of the predetermined portion of the apparatus prior to the radial expansion and plastic deformation.

297. The apparatus of claim 255, wherein the anisotropy of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, is at least about 1.48.

298. The apparatus of claim 255, wherein the yield point of the predetermined portion of the apparatus is at most about 57.8 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the apparatus is at least about 74.4 ksi after the radial expansion and plastic deformation.

299. The apparatus of claim 255, wherein the yield point of the predetermined portion of the apparatus after the radial expansion and plastic deformation is at least about 28 % greater than the yield point of the predetermined portion of the apparatus prior to the radial expansion and plastic deformation.

300. The apparatus of claim 255, wherein the anisotropy of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, is at least about 1.04.

301. The apparatus of claim 255, wherein the anisotropy of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, is at least about 1.92.
302. The apparatus of claim 255, wherein the anisotropy of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, is at least about 1.34.
303. The apparatus of claim 255, wherein the anisotropy of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, ranges from about 1.04 to about 1.92.
304. The apparatus of claim 255, wherein the yield point of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, ranges from about 47.6 ksi to about 61.7 ksi.
305. The apparatus of claim 255, wherein the expandability coefficient of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, is greater than 0.12.
306. The apparatus of claim 255, wherein the expandability coefficient of the predetermined portion of the apparatus is greater than the expandability coefficient of the other portion of the apparatus.
307. The apparatus of claim 255, wherein the apparatus comprises a wellbore casing;
308. The apparatus of claim 255, wherein the apparatus comprises a pipeline.
309. The apparatus of claim 255, wherein the apparatus comprises a structural support.
310. A method of joining radially expandable tubular members comprising:  
providing a first tubular member;  
engaging a second tubular member with the first tubular member to form a joint;  
providing a sleeve;  
mounting the sleeve for overlapping and coupling the first and second tubular members at the joint;



wherein the first tubular member, the second tubular member, and the sleeve define a tubular assembly; and  
radially expanding and plastically deforming the tubular assembly;  
wherein, prior to the radial expansion and plastic deformation, a predetermined portion of the tubular assembly has a lower yield point than another portion of the tubular assembly.

311. The method of claim 310, wherein the predetermined portion of the tubular assembly has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

312. The method of claim 310, wherein the predetermined portion of the tubular assembly has a higher ductility prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

313. The method of claim 310, wherein the predetermined portion of the tubular assembly has a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

314. The method of claim 310, wherein the predetermined portion of the tubular assembly has a larger inside diameter after the radial expansion and plastic deformation than the other portion of the tubular assembly.

315. The method of claim 314, further comprising:  
positioning another tubular assembly within the preexisting structure in overlapping relation to the tubular assembly; and  
radially expanding and plastically deforming the other tubular assembly within the preexisting structure;  
wherein, prior to the radial expansion and plastic deformation of the tubular assembly, a predetermined portion of the other tubular assembly has a lower yield point than another portion of the other tubular assembly.

316. The method of claim 315, wherein the inside diameter of the radially expanded and plastically deformed other portion of the tubular assembly is equal to the inside diameter of the radially expanded and plastically deformed other portion of the other tubular assembly.
317. The method of claim 310, wherein the predetermined portion of the tubular assembly comprises an end portion of the tubular assembly.
318. The method of claim 310, wherein the predetermined portion of the tubular assembly comprises a plurality of predetermined portions of the tubular assembly.
319. The method of claim 310, wherein the predetermined portion of the tubular assembly comprises a plurality of spaced apart predetermined portions of the tubular assembly.
320. The method of claim 310, wherein the other portion of the tubular assembly comprises an end portion of the tubular assembly.
321. The method of claim 310, wherein the other portion of the tubular assembly comprises a plurality of other portions of the tubular assembly.
322. The method of claim 310, wherein the other portion of the tubular assembly comprises a plurality of spaced apart other portions of the tubular assembly.
323. The method of claim 310, wherein the tubular assembly comprises a plurality of tubular members coupled to one another by corresponding tubular couplings.
324. The method of claim 323, wherein the tubular couplings comprise the predetermined portions of the tubular assembly, and wherein the tubular members comprise the other portion of the tubular assembly.
325. The method of claim 323, wherein one or more of the tubular couplings comprise the predetermined portions of the tubular assembly.
326. The method of claim 323, wherein one or more of the tubular members comprise the predetermined portions of the tubular assembly.

327. The method of claim 310, wherein the predetermined portion of the tubular assembly defines one or more openings.

328. The method of claim 327, wherein one or more of the openings comprise slots.

329. The method of claim 327, wherein the anisotropy for the predetermined portion of the tubular assembly is greater than 1.

330. The method of claim 310, wherein the anisotropy for the predetermined portion of the tubular assembly is greater than 1.

331. The method of claim 310, wherein the strain hardening exponent for the predetermined portion of the tubular assembly is greater than 0.12.

332. The method of claim 310, wherein the anisotropy for the predetermined portion of the tubular assembly is greater than 1; and wherein the strain hardening exponent for the predetermined portion of the tubular assembly is greater than 0.12.

333. The method of claim 310, wherein the predetermined portion of the tubular assembly comprises a first steel alloy comprising: 0.065 % C, 1.44 % Mn, 0.01 % P, 0.002 % S, 0.24 % Si, 0.01 % Cu, 0.01 % Ni, and 0.02 % Cr.

334. The method of claim 333, wherein the yield point of the predetermined portion of the tubular assembly is at most about 46.9 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the tubular assembly is at least about 65.9 ksi after the radial expansion and plastic deformation.

335. The method of claim 333, wherein the yield point of the predetermined portion of the tubular assembly after the radial expansion and plastic deformation is at least about 40 % greater than the yield point of the predetermined portion of the tubular assembly prior to the radial expansion and plastic deformation.

336. The method of claim 333, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is about 1.48.

337. The method of claim 310, wherein the predetermined portion of the tubular assembly comprises a second steel alloy comprising: 0.18 % C, 1.28 % Mn, 0.017 % P, 0.004 % S, 0.29 % Si, 0.01 % Cu, 0.01 % Ni, and 0.03 % Cr.

338. The method of claim 337, wherein the yield point of the predetermined portion of the tubular assembly is at most about 57.8 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the tubular assembly is at least about 74.4 ksi after the radial expansion and plastic deformation.

339. The method of claim 337, wherein the yield point of the predetermined portion of the tubular assembly after the radial expansion and plastic deformation is at least about 28 % greater than the yield point of the predetermined portion of the tubular assembly prior to the radial expansion and plastic deformation.

340. The method of claim 337, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is about 1.04.

341. The method of claim 310, wherein the predetermined portion of the tubular assembly comprises a third steel alloy comprising: 0.08 % C, 0.82 % Mn, 0.006 % P, 0.003 % S, 0.30 % Si, 0.16 % Cu, 0.05 % Ni, and 0.05 % Cr.

342. The method of claim 341, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is about 1.92.

343. The method of claim 310, wherein the predetermined portion of the tubular assembly comprises a fourth steel alloy comprising: 0.02 % C, 1.31 % Mn, 0.02 % P, 0.001 % S, 0.45 % Si, 9.1 % Ni, and 18.7 % Cr.

344. The method of claim 343, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is about 1.34.

345. The method of claim 310, wherein the yield point of the predetermined portion of the tubular assembly is at most about 46.9 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the tubular assembly is at least about 65.9 ksi after the radial expansion and plastic deformation.

346. The method of claim 310, wherein the yield point of the predetermined portion of the tubular assembly after the radial expansion and plastic deformation is at least about 40 % greater than the yield point of the predetermined portion of the tubular assembly prior to the radial expansion and plastic deformation.

347. The method of claim 310, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is at least about 1.48.

348. The method of claim 310, wherein the yield point of the predetermined portion of the tubular assembly is at most about 57.8 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the tubular assembly is at least about 74.4 ksi after the radial expansion and plastic deformation.

349. The method of claim 310, wherein the yield point of the predetermined portion of the tubular assembly after the radial expansion and plastic deformation is at least about 28 % greater than the yield point of the predetermined portion of the tubular assembly prior to the radial expansion and plastic deformation.

350. The method of claim 310, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is at least about 1.04.

351. The method of claim 310, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is at least about 1.92.

352. The method of claim 310, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is at least about 1.34.

353. The method of claim 310, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, ranges from about 1.04 to about 1.92.

354. The method of claim 310, wherein the yield point of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, ranges from about 47.6 ksi to about 61.7 ksi.

355. The method of claim 310, wherein the expandability coefficient of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is greater than 0.12.

356. The method of claim 310, wherein the expandability coefficient of the predetermined portion of the tubular assembly is greater than the expandability coefficient of the other portion of the tubular assembly.

357. The method of claim 310, wherein the tubular assembly comprises a wellbore casing.

358. The method of claim 310, wherein the tubular assembly comprises a pipeline.

359. The method of claim 310, wherein the tubular assembly comprises a structural support.

360. A method of joining radially expandable tubular members comprising:  
providing a first tubular member;  
engaging a second tubular member with the first tubular member to form a joint;  
providing a sleeve having opposite tapered ends and a flange, one of the tapered ends being a surface formed on the flange;

mounting the sleeve for overlapping and coupling the first and second tubular members at the joint, wherein the flange is engaged in a recess formed in an adjacent one of the tubular members;  
wherein the first tubular member, the second tubular member, and the sleeve define a tubular assembly; and  
radially expanding and plastically deforming the tubular assembly;  
wherein, prior to the radial expansion and plastic deformation, a predetermined portion of the tubular assembly has a lower yield point than another portion of the tubular assembly.

361. The method as defined in claim 360 further comprising:  
providing a tapered wall in the recess for mating engagement with the tapered end formed on the flange.
362. The method as defined in claim 360 further comprising:  
providing a flange at each tapered end wherein each tapered end is formed on a respective flange.
363. The method as defined in claim 362 further comprising:  
providing a recess in each tubular member.
364. The method as defined in claim 363 further comprising:  
engaging each flange in a respective one of the recesses.
365. The method as defined in claim 364 further comprising:  
providing a tapered wall in each recess for mating engagement with the tapered end formed on a respective one of the flanges.
366. The method of claim 360, wherein the predetermined portion of the tubular assembly has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

367. The method of claim 360, wherein the predetermined portion of the tubular assembly has a higher ductility prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

368. The method of claim 360, wherein the predetermined portion of the tubular assembly has a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

369. The method of claim 360, wherein the predetermined portion of the tubular assembly has a larger inside diameter after the radial expansion and plastic deformation than the other portion of the tubular assembly.

370. The method of claim 369, further comprising:  
positioning another tubular assembly within the preexisting structure in overlapping relation to the tubular assembly; and  
radially expanding and plastically deforming the other tubular assembly within the preexisting structure;  
wherein, prior to the radial expansion and plastic deformation of the tubular assembly, a predetermined portion of the other tubular assembly has a lower yield point than another portion of the other tubular assembly.

371. The method of claim 370, wherein the inside diameter of the radially expanded and plastically deformed other portion of the tubular assembly is equal to the inside diameter of the radially expanded and plastically deformed other portion of the other tubular assembly.

372. The method of claim 360, wherein the predetermined portion of the tubular assembly comprises an end portion of the tubular assembly.

373. The method of claim 360, wherein the predetermined portion of the tubular assembly comprises a plurality of predetermined portions of the tubular assembly.

374. The method of claim 360, wherein the predetermined portion of the tubular assembly comprises a plurality of spaced apart predetermined portions of the tubular assembly.



375. The method of claim 360, wherein the other portion of the tubular assembly comprises an end portion of the tubular assembly.

376. The method of claim 360, wherein the other portion of the tubular assembly comprises a plurality of other portions of the tubular assembly.

377. The method of claim 360, wherein the other portion of the tubular assembly comprises a plurality of spaced apart other portions of the tubular assembly.

378. The method of claim 360, wherein the tubular assembly comprises a plurality of tubular members coupled to one another by corresponding tubular couplings.

379. The method of claim 378, wherein the tubular couplings comprise the predetermined portions of the tubular assembly; and wherein the tubular members comprise the other portion of the tubular assembly.

380. The method of claim 378, wherein one or more of the tubular couplings comprise the predetermined portions of the tubular assembly.

381. The method of claim 378, wherein one or more of the tubular members comprise the predetermined portions of the tubular assembly.

382. The method of claim 360, wherein the predetermined portion of the tubular assembly defines one or more openings.

383. The method of claim 382, wherein one or more of the openings comprise slots.

384. The method of claim 382, wherein the anisotropy for the predetermined portion of the tubular assembly is greater than 1.

385. The method of claim 360, wherein the anisotropy for the predetermined portion of the tubular assembly is greater than 1.

386. The method of claim 360, wherein the strain hardening exponent for the predetermined portion of the tubular assembly is greater than 0.12.
387. The method of claim 360, wherein the anisotropy for the predetermined portion of the tubular assembly is greater than 1; and wherein the strain hardening exponent for the predetermined portion of the tubular assembly is greater than 0.12.
388. The method of claim 360, wherein the predetermined portion of the tubular assembly comprises a first steel alloy comprising: 0.065 % C, 1.44 % Mn, 0.01 % P, 0.002 % S, 0.24 % Si, 0.01 % Cu, 0.01 % Ni, and 0.02 % Cr.
389. The method of claim 388, wherein the yield point of the predetermined portion of the tubular assembly is at most about 46.9 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the tubular assembly is at least about 65.9 ksi after the radial expansion and plastic deformation.
390. The method of claim 388, wherein the yield point of the predetermined portion of the tubular assembly after the radial expansion and plastic deformation is at least about 40 % greater than the yield point of the predetermined portion of the tubular assembly prior to the radial expansion and plastic deformation.
391. The method of claim 388, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is about 1.48.
392. The method of claim 360, wherein the predetermined portion of the tubular assembly comprises a second steel alloy comprising: 0.18 % C, 1.28 % Mn, 0.017 % P, 0.004 % S, 0.29 % Si, 0.01 % Cu, 0.01 % Ni, and 0.03 % Cr.
393. The method of claim 392, wherein the yield point of the predetermined portion of the tubular assembly is at most about 57.8 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the tubular assembly is at least about 74.4 ksi after the radial expansion and plastic deformation.

394. The method of claim 392, wherein the yield point of the predetermined portion of the tubular assembly after the radial expansion and plastic deformation is at least about 28 % greater than the yield point of the predetermined portion of the tubular assembly prior to the radial expansion and plastic deformation.

395. The method of claim 392, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is about 1.04.

396. The method of claim 360, wherein the predetermined portion of the tubular assembly comprises a third steel alloy comprising: 0.08 % C, 0.82 % Mn, 0.006 % P, 0.003 % S, 0.30 % Si, 0.16 % Cu, 0.05 % Ni, and 0.05 % Cr.

397. The method of claim 396, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is about 1.92.

398. The method of claim 360, wherein the predetermined portion of the tubular assembly comprises a fourth steel alloy comprising: 0.02 % C, 1.31 % Mn, 0.02 % P, 0.001 % S, 0.45 % Si, 9.1 % Ni, and 18.7 % Cr.

399. The method of claim 398, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is about 1.34.

400. The method of claim 360, wherein the yield point of the predetermined portion of the tubular assembly is at most about 46.9 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the tubular assembly is at least about 65.9 ksi after the radial expansion and plastic deformation.

401. The method of claim 360, wherein the yield point of the predetermined portion of the tubular assembly after the radial expansion and plastic deformation is at least about 40 % greater than the yield point of the predetermined portion of the tubular assembly prior to the radial expansion and plastic deformation.

402. The method of claim 360, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is at least about 1.48.

403. The method of claim 360, wherein the yield point of the predetermined portion of the tubular assembly is at most about 57.8 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the tubular assembly is at least about 74.4 ksi after the radial expansion and plastic deformation.

404. The method of claim 360, wherein the yield point of the predetermined portion of the tubular assembly after the radial expansion and plastic deformation is at least about 28 % greater than the yield point of the predetermined portion of the tubular assembly prior to the radial expansion and plastic deformation.

405. The method of claim 360, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is at least about 1.04.

406. The method of claim 360, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is at least about 1.92.

407. The method of claim 360, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is at least about 1.34.

408. The method of claim 360, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, ranges from about 1.04 to about 1.92.

409. The method of claim 360, wherein the yield point of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, ranges from about 47.6 ksi to about 61.7 ksi.

410. The method of claim 360, wherein the expandability coefficient of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is greater than 0.12.
411. The method of claim 360, wherein the expandability coefficient of the predetermined portion of the tubular assembly is greater than the expandability coefficient of the other portion of the tubular assembly.
412. The method of claim 360, wherein the tubular assembly comprises a wellbore casing.
413. The method of claim 360, wherein the tubular assembly comprises a pipeline.
414. The method of claim 360, wherein the tubular assembly comprises a structural support.
415. The apparatus of claim 205, wherein at least a portion of the sleeve is comprised of a frangible material.
416. The apparatus of claim 205, wherein the wall thickness of the sleeve is variable.
417. The method of claim 310, wherein at least a portion of the sleeve is comprised of a frangible material.
418. The method of claim 310, wherein the sleeve comprises a variable wall thickness.
419. The apparatus of claim 205, further comprising:  
means for increasing the axial compression loading capacity of the joint between the first and second tubular members before and after a radial expansion and plastic deformation of the first and second tubular members.
420. The apparatus of claim 205, further comprising:  
means for increasing the axial tension loading capacity of the joint between the first and second tubular members before and after a radial expansion and plastic deformation of the first and second tubular members.

421. The apparatus of claim 205, further comprising:  
means for increasing the axial compression and tension loading capacity of the joint  
between the first and second tubular members before and after a radial  
expansion and plastic deformation of the first and second tubular members.
422. The apparatus of claim 205, further comprising:  
means for avoiding stress risers in the joint between the first and second tubular  
members before and after a radial expansion and plastic deformation of the  
first and second tubular members.
423. The apparatus of claim 205, further comprising:  
means for inducing stresses at selected portions of the coupling between the first and  
second tubular members before and after a radial expansion and plastic  
deformation of the first and second tubular members.
424. The apparatus of claim 205, wherein the sleeve is circumferentially tensioned; and  
wherein the first and second tubular members are circumferentially compressed.
425. The method of claim 310, further comprising:  
maintaining the sleeve in circumferential tension; and  
maintaining the first and second tubular members in circumferential compression.
426. The apparatus of claim 205, wherein the sleeve is circumferentially tensioned; and  
wherein the first and second tubular members are circumferentially compressed.
427. The apparatus of claim 205, wherein the sleeve is circumferentially tensioned; and  
wherein the first and second tubular members are circumferentially compressed.
428. The method of claim 310, further comprising:  
maintaining the sleeve in circumferential tension; and  
maintaining the first and second tubular members in circumferential compression.
429. The method of claim 310, further comprising:

maintaining the sleeve in circumferential tension; and  
maintaining the first and second tubular members in circumferential compression.

430. The apparatus of claim 419, wherein the means for increasing the axial compression loading capacity of the coupling between the first and second tubular members before and after a radial expansion and plastic deformation of the first and second tubular members is circumferentially tensioned; and wherein the first and second tubular members are circumferentially compressed.
431. The apparatus of claim 420, wherein the means for increasing the axial tension loading capacity of the coupling between the first and second tubular members before and after a radial expansion and plastic deformation of the first and second tubular members is circumferentially tensioned; and wherein the first and second tubular members are circumferentially compressed.
432. The apparatus of claim 421, wherein the means for increasing the axial compression and tension loading capacity of the coupling between the first and second tubular members before and after a radial expansion and plastic deformation of the first and second tubular members is circumferentially tensioned; and wherein the first and second tubular members are circumferentially compressed.
433. The apparatus of claim 422, wherein the means for avoiding stress risers in the coupling between the first and second tubular members before and after a radial expansion and plastic deformation of the first and second tubular members is circumferentially tensioned; and wherein the first and second tubular members are circumferentially compressed.
434. The apparatus of claim 423, wherein the means for inducing stresses at selected portions of the coupling between the first and second tubular members before and after a radial expansion and plastic deformation of the first and second tubular members is circumferentially tensioned; and wherein the first and second tubular members are circumferentially compressed.
435. An expandable tubular assembly, comprising:

a first tubular member;  
a second tubular member coupled to the first tubular member;  
a first threaded connection for coupling a portion of the first and second tubular members;  
a second threaded connection spaced apart from the first threaded connection for coupling another portion of the first and second tubular members;  
a tubular sleeve coupled to and receiving end portions of the first and second tubular members; and  
a sealing element positioned between the first and second spaced apart threaded connections for sealing an interface between the first and second tubular member;  
wherein the sealing element is positioned within an annulus defined between the first and second tubular members; and  
wherein, prior to a radial expansion and plastic deformation of the assembly, a predetermined portion of the assembly has a lower yield point than another portion of the apparatus.

436. The assembly of claim 435, wherein the predetermined portion of the assembly has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

437. The assembly of claim 435, wherein the predetermined portion of the assembly has a higher ductility prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

438. The assembly of claim 435, wherein the predetermined portion of the assembly has a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

439. The assembly of claim 435, wherein the predetermined portion of the assembly has a larger inside diameter after the radial expansion and plastic deformation than other portions of the tubular assembly.

440. The assembly of claim 439, further comprising:



positioning another assembly within the preexisting structure in overlapping relation to the assembly; and  
radially expanding and plastically deforming the other assembly within the preexisting structure;  
wherein, prior to the radial expansion and plastic deformation of the assembly, a predetermined portion of the other assembly has a lower yield point than another portion of the other assembly.

441. The assembly of claim 440, wherein the inside diameter of the radially expanded and plastically deformed other portion of the assembly is equal to the inside diameter of the radially expanded and plastically deformed other portion of the other assembly.

442. The assembly of claim 435, wherein the predetermined portion of the assembly comprises an end portion of the assembly.

443. The assembly of claim 435, wherein the predetermined portion of the assembly comprises a plurality of predetermined portions of the assembly.

444. The assembly of claim 435, wherein the predetermined portion of the assembly comprises a plurality of spaced apart predetermined portions of the assembly.

445. The assembly of claim 435, wherein the other portion of the assembly comprises an end portion of the assembly.

446. The assembly of claim 435, wherein the other portion of the assembly comprises a plurality of other portions of the assembly.

447. The assembly of claim 435, wherein the other portion of the assembly comprises a plurality of spaced apart other portions of the assembly.

448. The assembly of claim 435, wherein the assembly comprises a plurality of tubular members coupled to one another by corresponding tubular couplings.

449. The assembly of claim 448, wherein the tubular couplings comprise the predetermined portions of the assembly; and wherein the tubular members comprise the other portion of the assembly.
450. The assembly of claim 448, wherein one or more of the tubular couplings comprise the predetermined portions of the assembly.
451. The assembly of claim 448, wherein one or more of the tubular members comprise the predetermined portions of the assembly.
452. The assembly of claim 435, wherein the predetermined portion of the assembly defines one or more openings.
453. The assembly of claim 452, wherein one or more of the openings comprise slots.
454. The assembly of claim 452, wherein the anisotropy for the predetermined portion of the assembly is greater than 1.
455. The assembly of claim 435, wherein the anisotropy for the predetermined portion of the assembly is greater than 1.
456. The assembly of claim 435, wherein the strain hardening exponent for the predetermined portion of the assembly is greater than 0.12.
457. The assembly of claim 435, wherein the anisotropy for the predetermined portion of the assembly is greater than 1; and wherein the strain hardening exponent for the predetermined portion of the assembly is greater than 0.12.
458. The assembly of claim 435, wherein the predetermined portion of the assembly comprises a first steel alloy comprising: 0.065 % C, 1.44 % Mn, 0.01 % P, 0.002 % S, 0.24 % Si, 0.01 % Cu, 0.01 % Ni, and 0.02 % Cr.
459. The assembly of claim 458, wherein the yield point of the predetermined portion of the assembly is at most about 46.9 ksi prior to the radial expansion and plastic deformation;

and wherein the yield point of the predetermined portion of the assembly is at least about 65.9 ksi after the radial expansion and plastic deformation.

460. The assembly of claim 458, wherein the yield point of the predetermined portion of the assembly after the radial expansion and plastic deformation is at least about 40 % greater than the yield point of the predetermined portion of the assembly prior to the radial expansion and plastic deformation.

461. The assembly of claim 458, wherein the anisotropy of the predetermined portion of the assembly, prior to the radial expansion and plastic deformation, is about 1.48.

462. The assembly of claim 435, wherein the predetermined portion of the assembly comprises a second steel alloy comprising: 0.18 % C, 1.28 % Mn, 0.017 % P, 0.004 % S, 0.29 % Si, 0.01 % Cu, 0.01 % Ni, and 0.03 % Cr.

463. The assembly of claim 462, wherein the yield point of the predetermined portion of the assembly is at most about 57.8 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the assembly is at least about 74.4 ksi after the radial expansion and plastic deformation.

464. The assembly of claim 462, wherein the yield point of the predetermined portion of the assembly after the radial expansion and plastic deformation is at least about 28 % greater than the yield point of the predetermined portion of the assembly prior to the radial expansion and plastic deformation.

465. The assembly of claim 462, wherein the anisotropy of the predetermined portion of the assembly, prior to the radial expansion and plastic deformation, is about 1.04.

466. The assembly of claim 435, wherein the predetermined portion of the assembly comprises a third steel alloy comprising: 0.08 % C, 0.82 % Mn, 0.006 % P, 0.003 % S, 0.30 % Si, 0.16 % Cu, 0.05 % Ni, and 0.05 % Cr.

467. The assembly of claim 466, wherein the anisotropy of the predetermined portion of the assembly, prior to the radial expansion and plastic deformation, is about 1.92.

468. The assembly of claim 435, wherein the predetermined portion of the assembly comprises a fourth steel alloy comprising: 0.02 % C, 1.31 % Mn, 0.02 % P, 0.001 % S, 0.45 % Si, 9.1 % Ni, and 18.7 % Cr.

469. The assembly of claim 468, wherein the anisotropy of the predetermined portion of the assembly, prior to the radial expansion and plastic deformation, is about 1.34.

470. The assembly of claim 516, wherein the yield point of the predetermined portion of the assembly is at most about 46.9 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the assembly is at least about 65.9 ksi after the radial expansion and plastic deformation.

471. The assembly of claim 435, wherein the yield point of the predetermined portion of the assembly after the radial expansion and plastic deformation is at least about 40 % greater than the yield point of the predetermined portion of the assembly prior to the radial expansion and plastic deformation.

472. The assembly of claim 435, wherein the anisotropy of the predetermined portion of the assembly, prior to the radial expansion and plastic deformation, is at least about 1.48.

473. The assembly of claim 435, wherein the yield point of the predetermined portion of the assembly is at most about 57.8 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the assembly is at least about 74.4 ksi after the radial expansion and plastic deformation.

474. The assembly of claim 435, wherein the yield point of the predetermined portion of the assembly after the radial expansion and plastic deformation is at least about 28 % greater than the yield point of the predetermined portion of the assembly prior to the radial expansion and plastic deformation.

475. The assembly of claim 435, wherein the anisotropy of the predetermined portion of the assembly, prior to the radial expansion and plastic deformation, is at least about 1.04.

476. The assembly of claim 435, wherein the anisotropy of the predetermined portion of the assembly, prior to the radial expansion and plastic deformation, is at least about 1.92.
477. The assembly of claim 435, wherein the anisotropy of the predetermined portion of the assembly, prior to the radial expansion and plastic deformation, is at least about 1.34.
478. The assembly of claim 435, wherein the anisotropy of the predetermined portion of the assembly, prior to the radial expansion and plastic deformation, ranges from about 1.04 to about 1.92.
479. The assembly of claim 435, wherein the yield point of the predetermined portion of the assembly, prior to the radial expansion and plastic deformation, ranges from about 47.6 ksi to about 61.7 ksi.
480. The assembly of claim 435, wherein the expandability coefficient of the predetermined portion of the assembly, prior to the radial expansion and plastic deformation, is greater than 0.12.
481. The assembly of claim 435, wherein the expandability coefficient of the predetermined portion of the assembly is greater than the expandability coefficient of the other portion of the assembly.
482. The assembly of claim 435, wherein the assembly comprises a wellbore casing.
483. The assembly of claim 435, wherein the assembly comprises a pipeline.
484. The assembly of claim 435, wherein the assembly comprises a structural support.
485. The assembly of claim 435, wherein the annulus is at least partially defined by an irregular surface.
486. The assembly of claim 435, wherein the annulus is at least partially defined by a toothed surface.

487. The assembly of claim 435, wherein the sealing element comprises an elastomeric material.

488. The assembly of claim 435, wherein the sealing element comprises a metallic material.

489. The assembly of claim 435, wherein the sealing element comprises an elastomeric and a metallic material.

490. A method of joining radially expandable tubular members comprising:  
providing a first tubular member;  
providing a second tubular member;  
providing a sleeve;  
mounting the sleeve for overlapping and coupling the first and second tubular members;  
threadably coupling the first and second tubular members at a first location;  
threadably coupling the first and second tubular members at a second location spaced apart from the first location;  
sealing an interface between the first and second tubular members between the first and second locations using a compressible sealing element, wherein the first tubular member, second tubular member, sleeve, and the sealing element define a tubular assembly; and  
radially expanding and plastically deforming the tubular assembly;  
wherein, prior to the radial expansion and plastic deformation, a predetermined portion of the tubular assembly has a lower yield point than another portion of the tubular assembly.

491. The method as defined in claim 490 wherein the sealing element includes an irregular surface.

492. The method as defined in claim 490, wherein the sealing element includes a toothed surface.

493. The method as defined in claim 490, wherein the sealing element comprises an elastomeric material.

494. The method as defined in claim 490, wherein the sealing element comprises a metallic material.

495. The method as defined in claim 490, wherein the sealing element comprises an elastomeric and a metallic material.

496. The method of claim 490, wherein the predetermined portion of the tubular assembly has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

497. The method of claim 490, wherein the predetermined portion of the tubular assembly has a higher ductility prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

498. The method of claim 490, wherein the predetermined portion of the tubular assembly has a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

499. The method of claim 490 wherein the predetermined portion of the tubular assembly has a larger inside diameter after the radial expansion and plastic deformation than the other portion of the tubular assembly.

500. The method of claim 490, further comprising:  
positioning another tubular assembly within the preexisting structure in overlapping relation to the tubular assembly; and  
radially expanding and plastically deforming the other tubular assembly within the preexisting structure;  
wherein, prior to the radial expansion and plastic deformation of the tubular assembly, a predetermined portion of the other tubular assembly has a lower yield point than another portion of the other tubular assembly.

501. The method of claim 500, wherein the inside diameter of the radially expanded and plastically deformed other portion of the tubular assembly is equal to the inside diameter of the radially expanded and plastically deformed other portion of the other tubular assembly.

502. The method of claim 490, wherein the predetermined portion of the tubular assembly comprises an end portion of the tubular assembly.

503. The method of claim 490, wherein the predetermined portion of the tubular assembly comprises a plurality of predetermined portions of the tubular assembly.

504. The method of claim 490, wherein the predetermined portion of the tubular assembly comprises a plurality of spaced apart predetermined portions of the tubular assembly.

505. The method of claim 490, wherein the other portion of the tubular assembly comprises an end portion of the tubular assembly.

506. The method of claim 490, wherein the other portion of the tubular assembly comprises a plurality of other portions of the tubular assembly.

507. The method of claim 490, wherein the other portion of the tubular assembly comprises a plurality of spaced apart other portions of the tubular assembly.

508. The method of claim 490, wherein the tubular assembly comprises a plurality of tubular members coupled to one another by corresponding tubular couplings.

509. The method of claim 508, wherein the tubular couplings comprise the predetermined portions of the tubular assembly; and wherein the tubular members comprise the other portion of the tubular assembly.

510. The method of claim 508, wherein one or more of the tubular couplings comprise the predetermined portions of the tubular assembly.

511. The method of claim 508, wherein one or more of the tubular members comprise the predetermined portions of the tubular assembly.



512. The method of claim 490, wherein the predetermined portion of the tubular assembly defines one or more openings.

513. The method of claim 512, wherein one or more of the openings comprise slots.

514. The method of claim 512, wherein the anisotropy for the predetermined portion of the tubular assembly is greater than 1.

515. The method of claim 490, wherein the anisotropy for the predetermined portion of the tubular assembly is greater than 1.

516. The method of claim 490, wherein the strain hardening exponent for the predetermined portion of the tubular assembly is greater than 0.12.

517. The method of claim 490, wherein the anisotropy for the predetermined portion of the tubular assembly is greater than 1; and wherein the strain hardening exponent for the predetermined portion of the tubular assembly is greater than 0.12.

518. The method of claim 490, wherein the predetermined portion of the tubular assembly comprises a first steel alloy comprising: 0.085 % C, 1.44 % Mn, 0.01 % P, 0.002 % S, 0.24 % Si, 0.01 % Cu, 0.01 % Ni, and 0.02 % Cr.

519. The method of claim 518, wherein the yield point of the predetermined portion of the tubular assembly is at most about 46.9 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the tubular assembly is at least about 65.9 ksi after the radial expansion and plastic deformation.

520. The method of claim 518, wherein the yield point of the predetermined portion of the tubular assembly after the radial expansion and plastic deformation is at least about 40 % greater than the yield point of the predetermined portion of the tubular assembly prior to the radial expansion and plastic deformation.

521. The method of claim 518, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is about 1.48.

522. The method of claim 490, wherein the predetermined portion of the tubular assembly comprises a second steel alloy comprising: 0.18 % C, 1.28 % Mn, 0.017 % P, 0.004 % S, 0.29 % Si, 0.01 % Cu, 0.01 % Ni, and 0.03 % Cr.

523. The method of claim 522, wherein the yield point of the predetermined portion of the tubular assembly is at most about 57.8 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the tubular assembly is at least about 74.4 ksi after the radial expansion and plastic deformation.

524. The method of claim 522, wherein the yield point of the predetermined portion of the tubular assembly after the radial expansion and plastic deformation is at least about 28 % greater than the yield point of the predetermined portion of the tubular assembly prior to the radial expansion and plastic deformation.

525. The method of claim 522, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is about 1.04.

526. The method of claim 490, wherein the predetermined portion of the tubular assembly comprises a third steel alloy comprising: 0.08 % C, 0.82 % Mn, 0.006 % P, 0.003 % S, 0.30 % Si, 0.16 % Cu, 0.05 % Ni, and 0.05 % Cr.

527. The method of claim 526, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is about 1.92.

528. The method of claim 490, wherein the predetermined portion of the tubular assembly comprises a fourth steel alloy comprising: 0.02 % C, 1.31 % Mn, 0.02 % P, 0.001 % S, 0.45 % Si, 9.1 % Ni, and 18.7 % Cr.

529. The method of claim 528, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is about 1.34.

530. The method of claim 490, wherein the yield point of the predetermined portion of the tubular assembly is at most about 46.9 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the tubular assembly is at least about 65.9 ksi after the radial expansion and plastic deformation.

531. The method of claim 490, wherein the yield point of the predetermined portion of the tubular assembly after the radial expansion and plastic deformation is at least about 40 % greater than the yield point of the predetermined portion of the tubular assembly prior to the radial expansion and plastic deformation.

532. The method of claim 490, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is at least about 1.48.

533. The method of claim 490, wherein the yield point of the predetermined portion of the tubular assembly is at most about 57.8 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the tubular assembly is at least about 74.4 ksi after the radial expansion and plastic deformation.

534. The method of claim 490, wherein the yield point of the predetermined portion of the tubular assembly after the radial expansion and plastic deformation is at least about 28 % greater than the yield point of the predetermined portion of the tubular assembly prior to the radial expansion and plastic deformation.

535. The method of claim 490, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is at least about 1.04.

536. The method of claim 490, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is at least about 1.92.

537. The method of claim 490, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is at least about 1.34.

538. The method of claim 490, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, ranges from about 1.04 to about 1.92.

539. The method of claim 490, wherein the yield point of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, ranges from about 47.6 ksi to about 61.7 ksi.

540. The method of claim 490, wherein the expandability coefficient of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is greater than 0.12.

541. The method of claim 490, wherein the expandability coefficient of the predetermined portion of the tubular assembly is greater than the expandability coefficient of the other portion of the tubular assembly.

542. The method of claim 490, wherein the tubular assembly comprises a wellbore casing.

543. The method of claim 490, wherein the tubular assembly comprises a pipeline.

544. The method of claim 490, wherein the tubular assembly comprises a structural support.

545. The apparatus of claim 205, wherein the sleeve comprises:  
a plurality of spaced apart tubular sleeves coupled to and receiving end portions of  
the first and second tubular members.

546. The apparatus of claim 545, wherein the first tubular member comprises a first threaded connection; wherein the second tubular member comprises a second threaded connection; wherein the first and second threaded connections are coupled to one another;

wherein at least one of the tubular sleeves is positioned in opposing relation to the first threaded connection; and wherein at least one of the tubular sleeves is positioned in opposing relation to the second threaded connection.

547. The apparatus of claim 545, wherein the first tubular member comprises a first threaded connection; wherein the second tubular member comprises a second threaded connection; wherein the first and second threaded connections are coupled to one another; and wherein at least one of the tubular sleeves is not positioned in opposing relation to the first and second threaded connections.

548. The method of claim 310, further comprising:  
threadably coupling the first and second tubular members at a first location;  
threadably coupling the first and second tubular members at a second location  
spaced apart from the first location;  
providing a plurality of sleeves; and  
mounting the sleeves at spaced apart locations for overlapping and coupling the first  
and second tubular members.

549. The method of claim 548, wherein at least one of the tubular sleeves is positioned in opposing relation to the first threaded coupling; and wherein at least one of the tubular sleeves is positioned in opposing relation to the second threaded coupling.

550. The method of claim 548, wherein at least one of the tubular sleeves is not positioned in opposing relation to the first and second threaded couplings.

551. The apparatus of claim 205, further comprising:  
a threaded connection for coupling a portion of the first and second tubular members;  
wherein at least a portion of the threaded connection is upset.

552. The apparatus of claim 551, wherein at least a portion of tubular sleeve penetrates the first tubular member.

553. The method of claim 310, further comprising:  
threadably coupling the first and second tubular members; and

upsetting the threaded coupling.

554. The apparatus of claim 205, wherein the first tubular member further comprises an annular extension extending therefrom; and wherein the flange of the sleeve defines an annular recess for receiving and mating with the annular extension of the first tubular member.
555. The method of claim 310, wherein the first tubular member further comprises an annular extension extending therefrom; and wherein the flange of the sleeve defines an annular recess for receiving and mating with the annular extension of the first tubular member.
556. The apparatus of claim 205, further comprising:  
one or more stress concentrators for concentrating stresses in the joint.
557. The apparatus as defined in claim 556, wherein one or more of the stress concentrators comprises one or more external grooves defined in the first tubular member.
558. The apparatus as defined in claim 556, wherein one or more of the stress concentrators comprises one or more internal grooves defined in the second tubular member.
559. The apparatus as defined in claim 556, wherein one or more of the stress concentrators comprises one or more openings defined in the sleeve.
560. The apparatus as defined in claim 556, wherein one or more of the stress concentrators comprises one or more external grooves defined in the first tubular member; and wherein one or more of the stress concentrators comprises one or more internal grooves defined in the second tubular member.
561. The apparatus as defined in claim 556, wherein one or more of the stress concentrators comprises one or more external grooves defined in the first tubular

member; and wherein one or more of the stress concentrators comprises one or more openings defined in the sleeve.

562. The apparatus as defined in claim 556, wherein one or more of the stress concentrators comprises one or more internal grooves defined in the second tubular member; and wherein one or more of the stress concentrators comprises one or more openings defined in the sleeve.

563. The apparatus as defined in claim 556, wherein one or more of the stress concentrators comprises one or more external grooves defined in the first tubular member; wherein one or more of the stress concentrators comprises one or more internal grooves defined in the second tubular member; and wherein one or more of the stress concentrators comprises one or more openings defined in the sleeve.

564. The method of claim 310, further comprising:  
concentrating stresses within the joint.

565. The method as defined in claim 564, wherein concentrating stresses within the joint comprises using the first tubular member to concentrate stresses within the joint.

566. The method as defined in claim 564, wherein concentrating stresses within the joint comprises using the second tubular member to concentrate stresses within the joint.

567. The method as defined in claim 564, wherein concentrating stresses within the joint comprises using the sleeve to concentrate stresses within the joint.

568. The method as defined in claim 564, wherein concentrating stresses within the joint comprises using the first tubular member and the second tubular member to concentrate stresses within the joint.

569. The method as defined in claim 564, wherein concentrating stresses within the joint comprises using the first tubular member and the sleeve to concentrate stresses within the joint.

570. The method as defined in claim 564, wherein concentrating stresses within the joint comprises using the second tubular member and the sleeve to concentrate stresses within the joint.
571. The method as defined in claim 564, wherein concentrating stresses within the joint comprises using the first tubular member, the second tubular member, and the sleeve to concentrate stresses within the joint.
572. The apparatus of claim 205, further comprising:  
means for maintaining portions of the first and second tubular member in circumferential compression following the radial expansion and plastic deformation of the first and second tubular members.
573. The apparatus of claim 205, further comprising:  
means for concentrating stresses within the mechanical connection during the radial expansion and plastic deformation of the first and second tubular members.
574. The apparatus of claim 205, further comprising:  
means for maintaining portions of the first and second tubular member in circumferential compression following the radial expansion and plastic deformation of the first and second tubular members; and  
means for concentrating stresses within the mechanical connection during the radial expansion and plastic deformation of the first and second tubular members.
575. The method of claim 310, further comprising:  
maintaining portions of the first and second tubular member in circumferential compression following a radial expansion and plastic deformation of the first and second tubular members.
576. The method of claim 310, further comprising:  
concentrating stresses within the joint during a radial expansion and plastic deformation of the first and second tubular members.
577. The method of claim 310, further comprising:



maintaining portions of the first and second tubular member in circumferential compression following a radial expansion and plastic deformation of the first and second tubular members; and  
concentrating stresses within the joint during a radial expansion and plastic deformation of the first and second tubular members.

578. The method of claim 1, wherein the carbon content of the predetermined portion of the tubular assembly is less than or equal to 0.12 percent; and wherein the carbon equivalent value for the predetermined portion of the tubular assembly is less than 0.21.

579. The method of claim 1, wherein the carbon content of the predetermined portion of the tubular assembly is greater than 0.12 percent; and wherein the carbon equivalent value for the predetermined portion of the tubular assembly is less than 0.36.

580. An expandable tubular member, wherein the carbon content of the tubular member is less than or equal to 0.12 percent; and wherein the carbon equivalent value for the tubular member is less than 0.21.

581. The tubular member of claim 580, wherein the tubular member comprises a wellbore casing.

582. An expandable tubular member, wherein the carbon content of the tubular member is greater than 0.12 percent; and wherein the carbon equivalent value for the tubular member is less than 0.36.

583. The tubular member of claim 582, wherein the tubular member comprises a wellbore casing.

584. The apparatus of claim 142, wherein the carbon content of the predetermined portion of the tubular assembly is less than or equal to 0.12 percent; and wherein the carbon equivalent value for the predetermined portion of the tubular assembly is less than 0.21.

585. The apparatus of claim 142, wherein the carbon content of the predetermined portion of the tubular assembly is greater than 0.12 percent; and wherein the carbon equivalent value for the predetermined portion of the tubular assembly is less than 0.36.

586. A method of selecting tubular members for radial expansion and plastic deformation, comprising:

selecting a tubular member from a collection of tubular member;

determining a carbon content of the selected tubular member;

determining a carbon equivalent value for the selected tubular member; and

If the carbon content of the selected tubular member is less than or equal to 0.12 percent

and the carbon equivalent value for the selected tubular member is less than 0.21,

then determining that the selected tubular member is suitable for radial expansion

and plastic deformation.

587. A method of selecting tubular members for radial expansion and plastic deformation, comprising:

selecting a tubular member from a collection of tubular member;

determining a carbon content of the selected tubular member;

determining a carbon equivalent value for the selected tubular member; and

If the carbon content of the selected tubular member is greater than 0.12 percent and the

carbon equivalent value for the selected tubular member is less than 0.36, then

determining that the selected tubular member is suitable for radial expansion and

plastic deformation.

588. The apparatus of claim 205, wherein the carbon content of the predetermined portion of the apparatus is less than or equal to 0.12 percent; and wherein the carbon equivalent value for the predetermined portion of the apparatus is less than 0.21.

589. The apparatus of claim 205, wherein the carbon content of the predetermined portion of the apparatus is greater than 0.12 percent; and wherein the carbon equivalent value for the predetermined portion of the apparatus is less than 0.36.

590. The method of claim 310, wherein the carbon content of the predetermined portion of the tubular assembly is less than or equal to 0.12 percent; and wherein the carbon equivalent value for the predetermined portion of the tubular assembly is less than 0.21.

591. The method of claim 310, wherein the carbon content of the predetermined portion of the tubular assembly is greater than 0.12 percent; and wherein the carbon equivalent value for the predetermined portion of the tubular assembly is less than 0.36.

592. An expandable tubular member, comprising:  
a tubular body;  
wherein a yield point of an inner tubular portion of the tubular body is less than a yield point of an outer tubular portion of the tubular body.

593. The expandable tubular member of claim 592, wherein the yield point of the inner tubular portion of the tubular body varies as a function of the radial position within the tubular body.

594. The expandable tubular member of claim 593, wherein the yield point of the inner tubular portion of the tubular body varies in an linear fashion as a function of the radial position within the tubular body.

595. The expandable tubular member of claim 593, wherein the yield point of the inner tubular portion of the tubular body varies in a non-linear fashion as a function of the radial position within the tubular body.

596. The expandable tubular member of claim 592, wherein the yield point of the outer tubular portion of the tubular body varies as a function of the radial position within the tubular body.

597. The expandable tubular member of claim 596, wherein the yield point of the outer tubular portion of the tubular body varies in an linear fashion as a function of the radial position within the tubular body.

598. The expandable tubular member of claim 596, wherein the yield point of the outer tubular portion of the tubular body varies in a non-linear fashion as a function of the radial position within the tubular body.

599. The expandable tubular member of claim 592,  
wherein the yield point of the inner tubular portion of the tubular body varies as a function of the radial position within the tubular body; and  
wherein the yield point of the outer tubular portion of the tubular body varies as a function of the radial position within the tubular body.

600. The expandable tubular member of claim 599, wherein the yield point of the inner tubular portion of the tubular body varies in a linear fashion as a function of the radial position within the tubular body; and wherein the yield point of the outer tubular portion of the tubular body varies in a linear fashion as a function of the radial position within the tubular body.

601. The expandable tubular member of claim 599, wherein the yield point of the inner tubular portion of the tubular body varies in a linear fashion as a function of the radial position within the tubular body; and wherein the yield point of the outer tubular portion of the tubular body varies in a non-linear fashion as a function of the radial position within the tubular body.

602. The expandable tubular member of claim 599, wherein the yield point of the inner tubular portion of the tubular body varies in a non-linear fashion as a function of the radial position within the tubular body; and wherein the yield point of the outer tubular portion of the tubular body varies in a linear fashion as a function of the radial position within the tubular body.

603. The expandable tubular member of claim 599, wherein the yield point of the inner tubular portion of the tubular body varies in a non-linear fashion as a function of the radial position within the tubular body; and wherein the yield point of the outer tubular portion of the tubular body varies in a non-linear fashion as a function of the radial position within the tubular body.

604. The expandable tubular member of claim 599, wherein the rate of change of the yield point of the inner tubular portion of the tubular body is different than the rate of change of the yield point of the outer tubular portion of the tubular body.

605. The expandable tubular member of claim 599, wherein the rate of change of the yield point of the inner tubular portion of the tubular body is different than the rate of change of the yield point of the outer tubular portion of the tubular body.

606. The method of claim 1, wherein a yield point of an inner tubular portion of at least a portion of the tubular assembly is less than a yield point of an outer tubular portion of the portion of the tubular assembly.

607. The method of claim 606, wherein the yield point of the inner tubular portion of the tubular body varies as a function of the radial position within the tubular body.

608. The method of claim 607, wherein the yield point of the inner tubular portion of the tubular body varies in an linear fashion as a function of the radial position within the tubular body.

609. The method of claim 607, wherein the yield point of the inner tubular portion of the tubular body varies in an non-linear fashion as a function of the radial position within the tubular body.

610. The method of claim 608, wherein the yield point of the outer tubular portion of the tubular body varies as a function of the radial position within the tubular body.

611. The method of claim 610, wherein the yield point of the outer tubular portion of the tubular body varies in an linear fashion as a function of the radial position within the tubular body.

612. The method of claim 610, wherein the yield point of the outer tubular portion of the tubular body varies in an non-linear fashion as a function of the radial position within the tubular body.

613. The method of claim 606, wherein the yield point of the inner tubular portion of the tubular body varies as a function of the radial position within the tubular body; and wherein the yield point of the outer tubular portion of the tubular body varies as a function of the radial position within the tubular body.

614. The method of claim 613, wherein the yield point of the inner tubular portion of the tubular body varies in a linear fashion as a function of the radial position within the tubular body; and wherein the yield point of the outer tubular portion of the tubular body varies in a linear fashion as a function of the radial position within the tubular body.

615. The method of claim 613, wherein the yield point of the inner tubular portion of the tubular body varies in a linear fashion as a function of the radial position within the tubular body; and wherein the yield point of the outer tubular portion of the tubular body varies in a non-linear fashion as a function of the radial position within the tubular body.

616. The method of claim 613, wherein the yield point of the inner tubular portion of the tubular body varies in a non-linear fashion as a function of the radial position within the tubular body; and wherein the yield point of the outer tubular portion of the tubular body varies in a linear fashion as a function of the radial position within the tubular body.

617. The method of claim 613, wherein the yield point of the inner tubular portion of the tubular body varies in a non-linear fashion as a function of the radial position within the tubular body; and wherein the yield point of the outer tubular portion of the tubular body varies in a non-linear fashion as a function of the radial position within the tubular body.

618. The method of claim 613, wherein the rate of change of the yield point of the inner tubular portion of the tubular body is different than the rate of change of the yield point of the outer tubular portion of the tubular body.

619. The method of claim 613, wherein the rate of change of the yield point of the inner tubular portion of the tubular body is different than the rate of change of the yield point of the outer tubular portion of the tubular body.

620. The apparatus of claim 142, wherein a yield point of an inner tubular portion of at least a portion of the tubular assembly is less than a yield point of an outer tubular portion of the portion of the tubular assembly.

621. The apparatus of claim 620, wherein the yield point of the inner tubular portion of the tubular body varies as a function of the radial position within the tubular body.

622. The apparatus of claim 621, wherein the yield point of the inner tubular portion of the tubular body varies in an linear fashion as a function of the radial position within the tubular body.

623. The apparatus of claim 621, wherein the yield point of the inner tubular portion of the tubular body varies in an non-linear fashion as a function of the radial position within the tubular body.

624. The apparatus of claim 620, wherein the yield point of the outer tubular portion of the tubular body varies as a function of the radial position within the tubular body.

625. The apparatus of claim 624, wherein the yield point of the outer tubular portion of the tubular body varies in an linear fashion as a function of the radial position within the tubular body.

626. The apparatus of claim 624, wherein the yield point of the outer tubular portion of the tubular body varies in an non-linear fashion as a function of the radial position within the tubular body.

627. The apparatus of claim 620, wherein the yield point of the inner tubular portion of the tubular body varies as a function of the radial position within the tubular body; and wherein the yield point of the outer tubular portion of the tubular body varies as a function of the radial position within the tubular body.

628. The apparatus of claim 627, wherein the yield point of the inner tubular portion of the tubular body varies in a linear fashion as a function of the radial position within the tubular

body; and wherein the yield point of the outer tubular portion of the tubular body varies in a linear fashion as a function of the radial position within the tubular body.

629. The apparatus of claim 627, wherein the yield point of the inner tubular portion of the tubular body varies in a linear fashion as a function of the radial position within the tubular body; and wherein the yield point of the outer tubular portion of the tubular body varies in a non-linear fashion as a function of the radial position within the tubular body.

630. The apparatus of claim 627, wherein the yield point of the inner tubular portion of the tubular body varies in a non-linear fashion as a function of the radial position within the tubular body; and wherein the yield point of the outer tubular portion of the tubular body varies in a linear fashion as a function of the radial position within the tubular body.

631. The apparatus of claim 627, wherein the yield point of the inner tubular portion of the tubular body varies in a non-linear fashion as a function of the radial position within the tubular body; and wherein the yield point of the outer tubular portion of the tubular body varies in a non-linear fashion as a function of the radial position within the tubular body.

632. The apparatus of claim 627, wherein the rate of change of the yield point of the inner tubular portion of the tubular body is different than the rate of change of the yield point of the outer tubular portion of the tubular body.

633. The apparatus of claim 627, wherein the rate of change of the yield point of the inner tubular portion of the tubular body is different than the rate of change of the yield point of the outer tubular portion of the tubular body.

634. The method of claim 1, wherein prior to the radial expansion and plastic deformation, at least a portion of the tubular assembly comprises a microstructure comprising a hard phase structure and a soft phase structure.

635. The method of claim 634, wherein prior to the radial expansion and plastic deformation, at least a portion of the tubular assembly comprises a microstructure comprising a transitional phase structure.



636. The method of claim 715, wherein the hard phase structure comprises martensite.
637. The method of claim 634, wherein the soft phase structure comprises ferrite.
638. The method of claim 634, wherein the transitional phase structure comprises retained austenite.
639. The method of claim 634, wherein the hard phase structure comprises martensite; wherein the soft phase structure comprises ferrite; and wherein the transitional phase structure comprises retained austenite.
640. The method of claim 634, wherein the portion of the tubular assembly comprising a microstructure comprising a hard phase structure and a soft phase structure comprises, by weight percentage, about 0.1% C, about 1.2% Mn, and about 0.3% Si.
641. The apparatus of claim 142, wherein at least a portion of the tubular assembly comprises a microstructure comprising a hard phase structure and a soft phase structure.
642. The apparatus of claim 641, wherein prior to the radial expansion and plastic deformation, at least a portion of the tubular assembly comprises a microstructure comprising a transitional phase structure.
643. The apparatus of claim 641, wherein the hard phase structure comprises martensite.
644. The apparatus of claim 641, wherein the soft phase structure comprises ferrite.
645. The apparatus of claim 641, wherein the transitional phase structure comprises retained austenite.
646. The apparatus of claim 641, wherein the hard phase structure comprises martensite; wherein the soft phase structure comprises ferrite; and wherein the transitional phase structure comprises retained austenite.

647. The apparatus of claim 641, wherein the portion of the tubular assembly comprising a microstructure comprising a hard phase structure and a soft phase structure comprises, by weight percentage, about 0.1% C, about 1.2% Mn, and about 0.3% Si.

648. A method of manufacturing an expandable tubular member, comprising:  
providing a tubular member;  
heat treating the tubular member; and  
quenching the tubular member;  
wherein following the quenching, the tubular member comprises a microstructure comprising a hard phase structure and a soft phase structure.

649. The method of claim 648, wherein the provided tubular member comprises, by weight percentage, 0.065% C, 1.44% Mn, 0.01% P, 0.002% S, 0.24% Si, 0.01% Cu, 0.01% Ni, 0.02% Cr, 0.05% V, 0.01% Mo, 0.01% Nb, and 0.01% Ti.

650. The method of claim 648, wherein the provided tubular member comprises, by weight percentage, 0.18% C, 1.28% Mn, 0.017% P, 0.004% S, 0.29% Si, 0.01% Cu, 0.01% Ni, 0.03% Cr, 0.04% V, 0.01% Mo, 0.03% Nb, and 0.01% Ti.

651. The method of claim 648, wherein the provided tubular member comprises, by weight percentage, 0.08% C, 0.82% Mn, 0.006% P, 0.003% S, 0.30% Si, 0.06% Cu, 0.05% Ni, 0.05% Cr, 0.03% V, 0.03% Mo, 0.01% Nb, and 0.01% Ti.

652. The method of claim 648, wherein the provided tubular member comprises a microstructure comprising one or more of the following: martensite, pearlite, vanadium carbide, nickel carbide, or titanium carbide.

653. The method of claim 648, wherein the provided tubular member comprises a microstructure comprising one or more of the following: pearlite or pearlite striation.

654. The method of claim 648, wherein the provided tubular member comprises a microstructure comprising one or more of the following: grain pearlite, widmanstatten martensite, vanadium carbide, nickel carbide, or titanium carbide.

655. The method of claim 648, wherein the heat treating comprises heating the provided tubular member for about 10 minutes at 790 °C.

656. The method of claim 648, wherein the quenching comprises quenching the heat treated tubular member in water.

657. The method of claim 648, wherein following the quenching, the tubular member comprises a microstructure comprising one or more of the following: ferrite, grain pearlite, or martensite.

658. The method of claim 648, wherein following the quenching, the tubular member comprises a microstructure comprising one or more of the following: ferrite, martensite, or bainite.

659. The method of claim 648, wherein following the quenching, the tubular member comprises a microstructure comprising one or more of the following: bainite, pearlite, or ferrite.

660. The method of claim 648, wherein following the quenching, the tubular member comprises a yield strength of about 67ksi and a tensile strength of about 95 ksi.

661. The method of claim 648, wherein following the quenching, the tubular member comprises a yield strength of about 82 ksi and a tensile strength of about 130 ksi.

662. The method of claim 648, wherein following the quenching, the tubular member comprises a yield strength of about 80 ksi and a tensile strength of about 97 ksi.

663. The method of claim 648, further comprising:  
positioning the quenched tubular member within a preexisting structure; and  
radially expanding and plastically deforming the tubular member within the preexisting structure.

664. The apparatus of claim 142, wherein at least a portion of the tubular assembly comprises a microstructure comprising a hard phase structure and a soft phase structure.

665. The apparatus of claim 664, wherein the portion of the tubular assembly comprises, by weight percentage, 0.065% C, 1.44% Mn, 0.01% P, 0.002% S, 0.24% Si, 0.01% Cu, 0.01% Ni, 0.02% Cr, 0.05% V, 0.01% Mo, 0.01% Nb, and 0.01%Ti.

666. The apparatus of claim 664, wherein the portion of the tubular assembly comprises, by weight percentage, 0.18% C, 1.28% Mn, 0.017% P, 0.004% S, 0.29% Si, 0.01% Cu, 0.01% Ni, 0.03% Cr, 0.04% V, 0.01% Mo, 0.03% Nb, and 0.01%Ti.

667. The apparatus of claim 664, wherein the portion of the tubular assembly comprises, by weight percentage, 0.08% C, 0.82% Mn, 0.006% P, 0.003% S, 0.30% Si, 0.06% Cu, 0.05% Ni, 0.05% Cr, 0.03% V, 0.03% Mo, 0.01% Nb, and 0.01%Ti.

668. The apparatus of claim 664, wherein the portion of the tubular assembly comprises a microstructure comprising one or more of the following: martensite, pearlite, vanadium carbide, nickel carbide, or titanium carbide.

669. The apparatus of claim 664, wherein the portion of the tubular assembly comprises a microstructure comprising one or more of the following: pearlite or pearlite striation.

670. The apparatus of claim 664, wherein the portion of the tubular assembly comprises a microstructure comprising one or more of the following: grain pearlite, widmanstatten martensite, vanadium carbide, nickel carbide, or titanium carbide.

671. The apparatus of claim 664, wherein the portion of the tubular assembly comprises a microstructure comprising one or more of the following: ferrite, grain pearlite, or martensite.

672. The apparatus of claim 664, wherein the portion of the tubular assembly comprises a microstructure comprising one or more of the following: ferrite, martensite, or bainite.

673. The apparatus of claim 664, wherein the portion of the tubular assembly comprises a microstructure comprising one or more of the following: bainite, pearlite, or ferrite.

674. The apparatus of claim 664, wherein the portion of the tubular assembly comprises a yield strength of about 67ksi and a tensile strength of about 95 ksi.

675. The apparatus of claim 664, wherein the portion of the tubular assembly comprises a yield strength of about 82 ksi and a tensile strength of about 130 ksi.

676. The apparatus of claim 664, wherein the portion of the tubular assembly comprises a yield strength of about 60 ksi and a tensile strength of about 97 ksi.

677. A method of radially expanding a tubular assembly, comprising:  
radially expanding and plastically deforming a lower portion of the tubular assembly  
by pressurizing the interior of the lower portion of the tubular assembly; and  
then, radially expanding and plastically deforming the remaining portion of the tubular  
assembly by contacting the interior of the tubular assembly with an expansion  
device.

678. The method of claim 677, wherein the expansion device comprises an adjustable expansion device.

679. The method of claim 677, wherein the expansion device comprises a hydroforming expansion device.

680. The method of claim 677, wherein the expansion device comprises a rotary expansion device.

681. The method of claim 677, wherein the lower portion of the tubular assembly has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

682. The method of claim 681, wherein the remaining portion of the tubular assembly has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

683. The method of claim 677, wherein the lower portion of the tubular assembly comprises a shoe defining a valveable passage.
684. A system for radially expanding a tubular assembly, comprising:  
means for radially expanding and plastically deforming a lower portion of the tubular assembly by pressurizing the interior of the lower portion of the tubular assembly; and  
then, means for radially expanding and plastically deforming the remaining portion of the tubular assembly by contacting the interior of the tubular assembly with an expansion device.
685. The system of claim 684, wherein the lower portion of the tubular assembly has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.
686. The system of claim 685, wherein the remaining portion of the tubular assembly has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.
687. A method of repairing a tubular assembly, comprising:  
positioning a tubular patch within the tubular assembly; and  
radially expanding and plastically deforming a tubular patch into engagement with the tubular assembly by pressurizing the interior of the tubular patch.
688. The method of claim 687, wherein the tubular patch has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.
689. A system for repairing a tubular assembly, comprising:  
means for positioning a tubular patch within the tubular assembly; and  
means for radially expanding and plastically deforming a tubular patch into engagement with the tubular assembly by pressurizing the interior of the tubular patch.

690. The system of claim 689, wherein the tubular patch has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

691. A method of radially expanding a tubular member, comprising:  
accumulating a supply of pressurized fluid; and  
controllably injecting the pressurized fluid into the interior of the tubular member.

692. The method of claim 691, wherein accumulating the supply of pressurized fluid comprises:

monitoring the operating pressure of the accumulated fluid; and  
if the operating pressure of the accumulated fluid is less than a predetermined amount, injecting pressurized fluid into the accumulated fluid.

693. The method of claim 691, wherein controllably injecting the pressurized fluid into the interior of the tubular member comprises:

monitoring the operating condition of the tubular member; and  
if the tubular member has been radially expanded, releasing the pressurized fluid from the interior of the tubular member.

694. An apparatus for radially expanding a tubular member, comprising:  
a fluid reservoir;  
a pump for pumping fluids out of the fluid reservoir;  
an accumulator for receiving and accumulating the fluids pumped from the reservoir;  
a flow control valve for controllably releasing the fluids accumulated within the reservoir; and  
an expansion element for engaging the interior of the tubular member to define a pressure chamber within the tubular member and receiving the released accumulated fluids into the pressure chamber.

695. An apparatus for radially expanding a tubular member, comprising:  
an expandable tubular member;  
a locking device positioned within the expandable tubular member releasably coupled to the expandable tubular member;

a tubular support member positioned within the expandable tubular member coupled to the locking device; and  
an adjustable expansion device positioned within the expandable tubular member coupled to the tubular support member;  
wherein at least a portion of the expandable tubular member has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

696. The apparatus of claim 695, further comprising:  
means for transmitting torque between the expandable tubular member and the tubular support member.
697. The apparatus of claim 695, further comprising:  
means for sealing the interface between the expandable tubular member and the tubular support member.
698. The apparatus of claim 695, further comprising:  
another tubular support member received within the tubular support member releasably coupled to the expandable tubular member.
699. The apparatus of claim 698, further comprising:  
means for transmitting torque between the expandable tubular member and the other tubular support member.
700. The apparatus of claim 698, further comprising:  
means for transmitting torque between the other tubular support member and the tubular support member.
701. The apparatus of claim 698, further comprising:  
means for sealing the interface between the other tubular support member and the tubular support member.
702. The apparatus of claim 698, further comprising:



means for sealing the interface between the expandable tubular member and the tubular support member.

703. The apparatus of claim 698, further comprising:  
means for sensing the operating pressure within the other tubular support member.
704. The apparatus of claim 698, further comprising:  
means for pressurizing the interior of the other tubular support member.
705. The apparatus of claim 698, further comprising:  
means for limiting axial displacement of the other tubular support member relative to the tubular support member.
706. The apparatus of claim 698, further comprising:  
a tubular liner coupled to an end of the expandable tubular member.
707. The apparatus of claim 695, further comprising:  
a tubular liner coupled to an end of the expandable tubular member.
708. An apparatus for radially expanding a tubular member, comprising:  
an expandable tubular member;  
a locking device positioned within the expandable tubular member releasably coupled to the expandable tubular member;  
a tubular support member positioned within the expandable tubular member coupled to the locking device;  
an adjustable expansion device positioned within the expandable tubular member coupled to the tubular support member;  
means for transmitting torque between the expandable tubular member and the tubular support member;  
means for sealing the interface between the expandable tubular member and the tubular support member;  
another tubular support member received within the tubular support member releasably coupled to the expandable tubular member;

means for transmitting torque between the expandable tubular member and the other tubular support member;  
means for transmitting torque between the other tubular support member and the tubular support member;  
means for sealing the interface between the other tubular support member and the tubular support member;  
means for sealing the interface between the expandable tubular member and the tubular support member;  
means for sensing the operating pressure within the other tubular support member;  
means for pressurizing the interior of the other tubular support member;  
means for limiting axial displacement of the other tubular support member relative to the tubular support member, and  
a tubular liner coupled to an end of the expandable tubular member;  
wherein at least a portion of the expandable tubular member has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

709. A method for radially expanding a tubular member, comprising:  
positioning a tubular member and an adjustable expansion device within a preexisting structure;  
radially expanding and plastically deforming at least a portion of the tubular member by pressurizing an interior portion of the tubular member;  
increasing the size of the adjustable expansion device; and  
radially expanding and plastically deforming another portion of the tubular member by displacing the adjustable expansion device relative to the tubular member.
710. The method of claim 709, further comprising:  
sensing an operating pressure within the tubular member.
711. The method of claim 709, wherein radially expanding and plastically deforming at least a portion of the tubular member by pressurizing an interior portion of the tubular member comprises:  
injecting fluidic material into the tubular member;  
sensing the operating pressure of the injected fluidic material; and

If the operating pressure of the injected fluidic material exceeds a predetermined value, permitting the fluidic material to enter a pressure chamber defined within the tubular member.

712. The method of claim 709, wherein at least a portion of the tubular member has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

713. The method of claim 709, wherein the portion of the tubular member comprises the pressurized portion of the tubular member.

714. A system for radially expanding a tubular member, comprising:  
means for positioning a tubular member and an adjustable expansion device within a preexisting structure;  
means for radially expanding and plastically deforming at least a portion of the tubular member by pressurizing an interior portion of the tubular member;  
means for increasing the size of the adjustable expansion device; and  
means for radially expanding and plastically deforming another portion of the tubular member by displacing the adjustable expansion device relative to the tubular member.

715. The system of claim 714, further comprising:  
sensing an operating pressure within the tubular member.

716. The system of claim 714, wherein radially expanding and plastically deforming at least a portion of the tubular member by pressurizing an interior portion of the tubular member comprises:

injecting fluidic material into the tubular member;  
sensing the operating pressure of the injected fluidic material; and  
if the operating pressure of the injected fluidic material exceeds a predetermined value, permitting the fluidic material to enter a pressure chamber defined within the tubular member.

717. The system of claim 714, wherein at least a portion of the tubular member has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

718. The system of claim 714, wherein the portion of the tubular member comprises the pressurized portion of the tubular member.

719. A method of radially expanding and plastically deforming an expandable tubular member, comprising:  
limiting the amount of radial expansion of the expandable tubular member.

720. The method of claim 719, wherein limiting the amount of radial expansion of the expandable tubular member comprises:  
coupling another tubular member to the expandable tubular member that limits the amount of the radial expansion of the expandable tubular member.

721. The method of claim 720, wherein the other tubular member defines:  
one or more slots.

722. The method of claim 720, wherein the other tubular member has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

723. An apparatus for radially expanding a tubular member, comprising:  
an expandable tubular member;  
an expansion device coupled to the expandable tubular member for radially expanding and plastically deforming the expandable tubular member; and  
an tubular expansion limiter coupled to the expandable tubular member for limiting the degree to which the expandable tubular member may be radially expanded and plastically deformed.

724. The apparatus of claim 723, wherein the tubular expansion limiter comprises a tubular member that defines one or more slots.

725. The apparatus of claim 723, wherein the tubular expansion limiter comprises a tubular member that has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

726. The apparatus of claim 723, further comprising:  
a locking device positioned within the expandable tubular member releasably coupled to the expandable tubular member;  
a tubular support member positioned within the expandable tubular member coupled to the locking device and the expansion device.

727. The apparatus of claim 723, wherein at least a portion of the expandable tubular member has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

728. The apparatus of claim 726, further comprising:  
means for transmitting torque between the expandable tubular member and the tubular support member.

729. The apparatus of claim 726, further comprising:  
means for sealing the interface between the expandable tubular member and the tubular support member.

730. The apparatus of claim 726, further comprising:  
means for sealing the interface between the expandable tubular member and the tubular support member.

731. The apparatus of claim 726, further comprising:  
means for sensing the operating pressure within the tubular support member.

732. The apparatus of claim 726, further comprising:  
means for pressurizing the interior of the tubular support member.

733. An apparatus for radially expanding a tubular member, comprising:  
an expandable tubular member;

an expansion device coupled to the expandable tubular member for radially expanding and plastically deforming the expandable tubular member;  
an tubular expansion limiter coupled to the expandable tubular member for limiting the degree to which the expandable tubular member may be radially expanded and plastically deformed;  
a locking device positioned within the expandable tubular member releasably coupled to the expandable tubular member;  
a tubular support member positioned within the expandable tubular member coupled to the locking device and the expansion device;  
means for transmitting torque between the expandable tubular member and the tubular support member;  
means for sealing the interface between the expandable tubular member and the tubular support member;  
means for sensing the operating pressure within the tubular support member; and  
means for pressurizing the interior of the tubular support member;  
wherein at least a portion of the expandable tubular member has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

734. A method for radially expanding a tubular member, comprising:  
positioning a tubular member and an adjustable expansion device within a preexisting structure;  
radially expanding and plastically deforming at least a portion of the tubular member by pressurizing an interior portion of the tubular member;  
limiting the extent to which the portion of the tubular member is radially expanded and plastically deformed by pressurizing the interior of the tubular member;  
increasing the size of the adjustable expansion device; and  
radially expanding and plastically deforming another portion of the tubular member by displacing the adjustable expansion device relative to the tubular member.
735. The method of claim 734, further comprising:  
sensing an operating pressure within the tubular member.

**736.** The method of claim 734, wherein radially expanding and plastically deforming at least a portion of the tubular member by pressurizing an interior portion of the tubular member comprises:

- injecting fluidic material into the tubular member;
- sensing the operating pressure of the injected fluidic material; and
- if the operating pressure of the injected fluidic material exceeds a predetermined value, permitting the fluidic material to enter a pressure chamber defined within the tubular member.

**737.** The method of claim 734, wherein at least a portion of the tubular member has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

**738.** The method of claim 734, wherein limiting the extent to which the portion of the tubular member is radially expanded and plastically deformed by pressurizing the interior of the tubular member comprises:

- applying a force to the exterior of the tubular member.

**739.** The method of claim 738, wherein applying a force to the exterior of the tubular member comprises:

- applying a variable force to the exterior of the tubular member.

**740.** A system for radially expanding a tubular member, comprising:

- means for positioning a tubular member and an adjustable expansion device within a preexisting structure;
- means for radially expanding and plastically deforming at least a portion of the tubular member by pressurizing an interior portion of the tubular member;
- means for limiting the extent to which the portion of the tubular member is radially expanded and plastically deformed by pressurizing the interior of the tubular member;
- means for increasing the size of the adjustable expansion device; and
- means for radially expanding and plastically deforming another portion of the tubular member by displacing the adjustable expansion device relative to the tubular member.

741. The method of claim 740, further comprising:  
means for sensing an operating pressure within the tubular member.
742. The method of claim 740, wherein means for radially expanding and plastically deforming at least a portion of the tubular member by pressurizing an interior portion of the tubular member comprises:  
means for injecting fluidic material into the tubular member;  
means for sensing the operating pressure of the injected fluidic material; and  
if the operating pressure of the injected fluidic material exceeds a predetermined value, means for permitting the fluidic material to enter a pressure chamber defined within the tubular member.
743. The method of claim 740, wherein at least a portion of the tubular member has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.
744. The method of claim 740, wherein means for limiting the extent to which the portion of the tubular member is radially expanded and plastically deformed by pressurizing the interior of the tubular member comprises:  
means for applying a force to the exterior of the tubular member.
745. The method of claim 738, wherein means for applying a force to the exterior of the tubular member comprises:  
means for applying a variable force to the exterior of the tubular member.
746. A system for radially expanding a tubular member, comprising:  
means for accumulating a supply of pressurized fluid; and  
means for controllably injecting the pressurized fluid into the interior of the tubular member.
747. The system of claim 746, wherein means for accumulating the supply of pressurized fluid comprises:  
means for monitoring the operating pressure of the accumulated fluid; and



if the operating pressure of the accumulated fluid is less than a predetermined amount, means for injecting pressurized fluid into the accumulated fluid.

748. The system of claim 726, wherein means for controllably injecting the pressurized fluid into the interior of the tubular member comprises:

means for monitoring the operating condition of the tubular member; and  
if the tubular member has been radial expanded, means for releasing the pressurized fluid from the interior of the tubular member.

749. An apparatus for radially expanding an expandable tubular member, comprising:  
an expandable tubular member;  
a locking device positioned within the expandable tubular member releasably coupled to the expandable tubular member;  
an actuator positioned within the expandable tubular member coupled to the locking device;  
a tubular support member positioned within the expandable tubular member coupled to the actuator;  
a first expansion device coupled to the tubular support member;  
a second expansion device coupled to the tubular support member; and  
an expandable tubular sleeve coupled to the second expansion device.

750. The apparatus of claim 749, wherein the outside diameters of the first and second expansion devices are unequal.

751. The apparatus of claim 750, wherein the outside diameter of the first expansion device is greater than the outside diameter of the second expansion device.

752. The apparatus of claim 749, wherein at least a portion of the expandable tubular member has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

753. The apparatus of claim 749, wherein at least a portion of the expandable tubular sleeve has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

754. The apparatus of claim 749, wherein the outside diameters of the first and second expansion devices are both less than or equal to the outside diameter of the expandable tubular member.
755. The apparatus of claim 749, wherein the outside diameter of the expandable tubular sleeve is less than or equal to the outside diameter of the expandable tubular member.
756. The apparatus of claim 748, further comprising:  
means for transmitting torque between the expandable tubular member and the tubular support member.
757. The apparatus of claim 748, further comprising:  
means for pressurizing the interior of the tubular support member.
758. The apparatus of claim 748, further comprising:  
means for limiting axial displacement of the expandable tubular sleeve.
759. The apparatus of claim 748, further comprising:  
means for limiting axial displacement of the expandable tubular member.
760. The apparatus of claim 758, further comprising:  
means for transmitting torque from the tubular support member to the means for limiting axial displacement of the expandable tubular sleeve.
761. The apparatus of claim 748, further comprising:  
means for displacing the first expansion device relative to the expandable tubular member to radially expand and plastically deform the expandable tubular member.
762. The apparatus of claim 748, further comprising:  
means for displacing the second expansion device relative to the expandable tubular sleeve to radially expand and plastically deform the expandable tubular sleeve.

763. The apparatus of claim 748, wherein the wall thickness of the expandable tubular sleeve is variable.

764. The apparatus of claim 748, wherein the expandable tubular sleeve comprises means for sealing an interface between the expandable tubular sleeve and the interior surface of the expandable tubular member.

765. An apparatus for radially expanding an expandable tubular member, comprising:  
an expandable tubular member;  
a locking device positioned within the expandable tubular member releasably coupled to the expandable tubular member;  
an actuator positioned within the expandable tubular member coupled to the locking device;  
a tubular support member positioned within the expandable tubular member coupled to the actuator;  
a first expansion device coupled to the tubular support member;  
a second expansion device coupled to the tubular support member;  
an expandable tubular sleeve coupled to the second expansion device;  
means for transmitting torque between the expandable tubular member and the tubular support member;  
means for pressurizing the interior of the tubular support member;  
means for limiting axial displacement of the expandable tubular sleeve;  
means for limiting axial displacement of the expandable tubular member;  
means for transmitting torque from the tubular support member to the means for limiting axial displacement of the expandable tubular sleeve;  
means for displacing the first expansion device relative to the expandable tubular member to radially expand and plastically deform the expandable tubular member; and  
means for displacing the second expansion device relative to the expandable tubular sleeve to radially expand and plastically deform the expandable tubular sleeve;  
wherein the outside diameter of the first expansion device is greater than the outside diameter of the second expansion device;

wherein at least a portion of the expandable tubular member has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation;

wherein at least a portion of the expandable tubular sleeve has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation;

wherein the outside diameters of the first and second expansion devices are both less than or equal to the outside diameter of the expandable tubular member;

wherein the outside diameter of the expandable tubular sleeve is less than or equal to the outside diameter of the expandable tubular member;

wherein the wall thickness of the expandable tubular sleeve is variable; and

wherein the expandable tubular sleeve comprises means for sealing an interface between the expandable tubular sleeve and the interior surface of the expandable tubular member.

766. A method for radially expanding a tubular member, comprising:  
positioning an expandable tubular member and an expandable tubular sleeve within a preexisting structure;  
radially expanding and plastically deforming at least a portion of the expandable tubular member onto the expandable tubular sleeve; and  
radially expanding and plastically deforming at least a portion of the expandable tubular sleeve.
767. The method of claim 766, further comprising:  
radially expanding and plastically deforming at least a portion of the expandable tubular member while simultaneously radially expanding and plastically deforming at least a portion of the expandable tubular sleeve.
768. The method of claim 766, further comprising:  
radially expanding and plastically deforming another portion of the expandable tubular member after radially expanding and plastically deforming the portion of the expandable tubular sleeve.

769. The method of claim 766, wherein at least a portion of the expandable tubular member has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.
770. The method of claim 766, wherein at least a portion of the expandable tubular sleeve has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.
771. The method of claim 766, wherein the wall thickness of the expandable tubular sleeve is variable.
772. The method of claim 766, further comprising:  
sealing an interface between the exterior surface of the expandable tubular sleeve  
and the interior surface of the expandable tubular member.
773. A system for radially expanding a tubular member, comprising:  
means for positioning an expandable tubular member and an expandable tubular sleeve within a preexisting structure;  
means for radially expanding and plastically deforming at least a portion of the expandable tubular member onto the expandable tubular sleeve; and  
means for radially expanding and plastically deforming at least a portion of the expandable tubular sleeve.
774. The system of claim 773, further comprising:  
means for radially expanding and plastically deforming at least a portion of the expandable tubular member while simultaneously radially expanding and plastically deforming at least a portion of the expandable tubular sleeve.
775. The system of claim 773, further comprising:  
means for radially expanding and plastically deforming another portion of the expandable tubular member after radially expanding and plastically deforming the portion of the expandable tubular sleeve.

776. The system of claim 773, wherein at least a portion of the expandable tubular member has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

777. The system of claim 773, wherein at least a portion of the expandable tubular sleeve has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

778. The system of claim 773, wherein the wall thickness of the expandable tubular sleeve is variable.

779. The system of claim 773, further comprising:  
sealing an interface between the exterior surface of the expandable tubular sleeve and the interior surface of the expandable tubular member.

780. An apparatus for radially expanding an expandable tubular member, comprising:  
an expandable tubular member;  
a locking device positioned within the expandable tubular member releasably coupled to the expandable tubular member;  
an actuator positioned within the expandable tubular member coupled to the locking device;  
a tubular support member positioned within the expandable tubular member coupled to the actuator;  
an adjustable expansion device coupled to the tubular support member;  
a non-adjustable expansion device coupled to the tubular support member; and  
an expandable tubular sleeve coupled to the non-adjustable expansion device.

781. The apparatus of claim 780, wherein at least a portion of the expandable tubular member has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

782. The apparatus of claim 780, wherein at least a portion of the expandable tubular sleeve has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

783. The apparatus of claim 780, wherein the outside diameters of the adjustable and non-adjustable expansion devices are both less than or equal to the outside diameter of the expandable tubular member.
784. The apparatus of claim 780, wherein the outside diameter of the expandable tubular sleeve is less than or equal to the outside diameter of the expandable tubular member.
785. The apparatus of claim 780, further comprising:  
means for transmitting torque between the expandable tubular member and the tubular support member.
786. The apparatus of claim 780, further comprising:  
means for pressurizing the interior of the tubular support member.
787. The apparatus of claim 780, further comprising:  
means for limiting axial displacement of the expandable tubular sleeve.
788. The apparatus of claim 780, further comprising:  
means for limiting axial displacement of the expandable tubular member.
789. The apparatus of claim 787, further comprising:  
means for transmitting torque from the tubular support member to the means for limiting axial displacement of the expandable tubular sleeve.
790. The apparatus of claim 788, further comprising:  
means for transmitting torque from the tubular support member to the means for limiting axial displacement of the expandable tubular member.
791. The apparatus of claim 780, further comprising:  
means for displacing the adjustable expansion device relative to the expandable tubular member to radially expand and plastically deform the expandable tubular member.

792. The apparatus of claim 791, further comprising:  
means for pulling the adjustable expansion device through the expandable tubular member to radially expand and plastically deform the expandable tubular member.
793. The apparatus of claim 792, further comprising:  
fluid powered means for pulling the adjustable expansion device through the expandable tubular member to radially expand and plastically deform the expandable tubular member.
794. The apparatus of claim 780, further comprising:  
means for displacing the non-adjustable expansion device relative to the expandable tubular sleeve to radially expand and plastically deform the expandable tubular sleeve.
795. The apparatus of claim 794, further comprising:  
fluid powered means for pulling the non-adjustable expansion device through the expandable tubular sleeve to radially expand and plastically deform the expandable tubular sleeve.
796. The apparatus of claim 780, wherein the wall thickness of the expandable tubular sleeve is variable.
797. The apparatus of claim 780, wherein the expandable tubular sleeve comprises means for sealing an interface between the expandable tubular sleeve and the interior surface of the expandable tubular member.
798. An apparatus for radially expanding an expandable tubular member, comprising:  
an expandable tubular member;  
a locking device positioned within the expandable tubular member releasably coupled to the expandable tubular member;  
an actuator positioned within the expandable tubular member coupled to the locking device;



a tubular support member positioned within the expandable tubular member coupled to the actuator;

an adjustable expansion device coupled to the tubular support member;

a non-adjustable expansion device coupled to the tubular support member;

an expandable tubular sleeve coupled to the non-adjustable expansion device;

means for transmitting torque between the expandable tubular member and the tubular support member;

means for pressurizing the interior of the tubular support member;

means for limiting axial displacement of the expandable tubular sleeve;

means for limiting axial displacement of the expandable tubular member;

means for transmitting torque from the tubular support member to the means for limiting axial displacement of the expandable tubular sleeve;

means for transmitting torque from the tubular support member to the means for limiting axial displacement of the expandable tubular member;

fluid powered means for pulling the adjustable expansion device through the expandable tubular member to radially expand and plastically deform the expandable tubular member; and

fluid powered means for pulling the non-adjustable expansion device through the expandable tubular sleeve to radially expand and plastically deform the expandable tubular sleeve;

wherein at least a portion of the expandable tubular member has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation;

wherein at least a portion of the expandable tubular sleeve has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation;

wherein the outside diameters of the adjustable and non-adjustable expansion devices are both less than or equal to the outside diameter of the expandable tubular member;

wherein the outside diameter of the expandable tubular sleeve is less than or equal to the outside diameter of the expandable tubular member;

wherein the wall thickness of the expandable tubular sleeve is variable; and

wherein the expandable tubular sleeve comprises means for sealing an interface between the expandable tubular sleeve and the interior surface of the expandable tubular member.

799. A method for radially expanding a tubular member, comprising:  
positioning an expandable tubular member, an expandable tubular sleeve, and an adjustable expansion device within a preexisting structure;  
increasing the size of the adjustable expansion device;  
radially expanding and plastically deforming at least a portion of the expandable tubular member onto the expandable tubular sleeve using the adjustable expansion device; and  
radially expanding and plastically deforming at least a portion of the expandable tubular sleeve.
800. The method of claim 799, further comprising:  
radially expanding and plastically deforming at least a portion of the expandable tubular member while simultaneously radially expanding and plastically deforming at least a portion of the expandable tubular sleeve.
801. The method of claim 799, further comprising:  
radially expanding and plastically deforming another portion of the expandable tubular member after radially expanding and plastically deforming the portion of the expandable tubular sleeve.
802. The method of claim 799, wherein at least a portion of the expandable tubular member has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.
803. The method of claim 799, wherein at least a portion of the expandable tubular sleeve has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.
804. The method of claim 799, wherein the wall thickness of the expandable tubular sleeve is variable.

805. The method of claim 799, further comprising:  
sealing an interface between the exterior surface of the expandable tubular sleeve  
and the interior surface of the expandable tubular member.
806. The method of claim 799, further comprising:  
pulling the adjustable expansion device through the expandable tubular member.
807. The method of claim 885, further comprising:  
pulling the adjustable expansion device through the expandable tubular member  
using fluid pressure.
808. A system for radially expanding a tubular member, comprising:  
means for positioning an expandable tubular member, an expandable tubular sleeve,  
and an adjustable expansion device within a preexisting structure;  
means for increasing the size of the adjustable expansion device;  
means for radially expanding and plastically deforming at least a portion of the  
expandable tubular member onto the expandable tubular sleeve using the  
adjustable expansion device; and  
means for radially expanding and plastically deforming at least a portion of the  
expandable tubular sleeve.
809. The system of claim 808, further comprising:  
means for radially expanding and plastically deforming at least a portion of the  
expandable tubular member while simultaneously radially expanding and  
plastically deforming at least a portion of the expandable tubular sleeve.
810. The system of claim 808, further comprising:  
means for radially expanding and plastically deforming another portion of the  
expandable tubular member after radially expanding and plastically deforming  
the portion of the expandable tubular sleeve.

811. The system of claim 808, wherein at least a portion of the expandable tubular member has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

812. The system of claim 808, wherein at least a portion of the expandable tubular sleeve has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

813. The system of claim 808, wherein the wall thickness of the expandable tubular sleeve is variable.

814. The system of claim 808, further comprising:  
means for sealing an interface between the exterior surface of the expandable tubular sleeve and the interior surface of the expandable tubular member.

815. The system of claim 808, further comprising:  
means for pulling the adjustable expansion device through the expandable tubular member.

816. The system of claim 815, further comprising:  
means for pulling the adjustable expansion device through the expandable tubular member using fluid pressure.

817. The apparatus of claim 780, further comprising:  
a perforated sleeve coupled to the expandable tubular member that receives the adjustable expansion device.

818. The method of claim 799, further comprising:  
preventing debris from damaging the adjustable expansion device.

819. The system of claim 808, further comprising:  
means for preventing debris from damaging the adjustable expansion device.

820. An apparatus for radially expanding an expandable tubular member, comprising:

an expandable tubular member;  
a locking device positioned within the expandable tubular member releasably coupled to the expandable tubular member;  
an actuator positioned within the expandable tubular member coupled to the locking device;  
a tubular support member positioned within the expandable tubular member coupled to the actuator; and  
an adjustable expansion device positioned within the expandable tubular member coupled to the tubular support member.

821. The apparatus of claim 820, wherein at least a portion of the expandable tubular member has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

822. The apparatus of claim 820, further comprising an expandable tubular sleeve coupled to an end of the expandable tubular member that receives the adjustable expansion device.

823. The apparatus of claim 822, wherein at least a portion of the expandable tubular sleeve has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

824. The apparatus of claim 820, further comprising:  
means for transmitting torque between the expandable tubular member and the tubular support member.

825. The apparatus of claim 820, further comprising:  
means for pressurizing the interior of the tubular support member.

826. The apparatus of claim 820, wherein the actuator comprises:  
means for displacing the adjustable expansion device relative to the expandable tubular member to radially expand and plastically deform the expandable tubular member.

827. The apparatus of claim 826, wherein the actuator further comprises:  
means for pulling the adjustable expansion device through the expandable tubular member to radially expand and plastically deform the expandable tubular member.
828. The apparatus of claim 827, wherein the actuator further comprises:  
fluid powered means for pulling the adjustable expansion device through the expandable tubular member to radially expand and plastically deform the expandable tubular member.
829. The apparatus of claim 827, further comprising:  
means for adjusting the size of the adjustable expansion device.
830. An apparatus for radially expanding an expandable tubular member, comprising:  
an expandable tubular member;  
a locking device positioned within the expandable tubular member releasably coupled to the expandable tubular member;  
an actuator positioned within the expandable tubular member coupled to the locking device;  
a tubular support member positioned within the expandable tubular member coupled to the actuator;  
an adjustable expansion device positioned within the expandable tubular member coupled to the tubular support member;  
an expandable tubular sleeve coupled to an end of the expandable tubular member that receives the adjustable expansion device;  
means for transmitting torque between the expandable tubular member and the tubular support member;  
means for pressurizing the interior of the tubular support member; and  
means for adjusting the size of the adjustable expansion device;  
fluid powered means for pulling the adjustable expansion device through the expandable tubular member to radially expand and plastically deform the expandable tubular member;

wherein at least a portion of the expandable tubular member has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation; and  
wherein at least a portion of the expandable tubular sleeve has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

831. A method for radially expanding a tubular member, comprising:  
positioning an expandable tubular member, an expandable tubular sleeve, and an adjustable expansion device within a preexisting structure;  
increasing the size of the adjustable expansion device to radially expand and plastically deform at least a portion of at least one of the expandable tubular member and the expandable tubular sleeve; and  
radially expanding and plastically deforming at least another portion of the expandable tubular member using the adjustable expansion device.
832. The method of claim 831, wherein at least a portion of the expandable tubular member has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.
833. The method of claim 831, wherein at least a portion of the expandable tubular sleeve has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.
834. The method of claim 831, further comprising:  
pulling the adjustable expansion device through the expandable tubular member.
835. The method of claim 831, further comprising:  
pulling the adjustable expansion device through the expandable tubular member using fluid pressure.
836. A system for radially expanding a tubular member, comprising:  
means for positioning an expandable tubular member, an expandable tubular sleeve, and an adjustable expansion device within a preexisting structure;

means for increasing the size of the adjustable expansion device to radially expand and plastically deform at least a portion of at least one of the expandable tubular member and the expandable tubular sleeve; and  
means for radially expanding and plastically deforming at least another portion of the expandable tubular member using the adjustable expansion device.

837. The system of claim 836, wherein at least a portion of the expandable tubular member has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

838. The system of claim 836, wherein at least a portion of the expandable tubular sleeve has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

839. The system of claim 836, further comprising:  
means for pulling the adjustable expansion device through the expandable tubular member.

840. The system of claim 836, further comprising:  
means for pulling the adjustable expansion device through the expandable tubular member using fluid pressure.



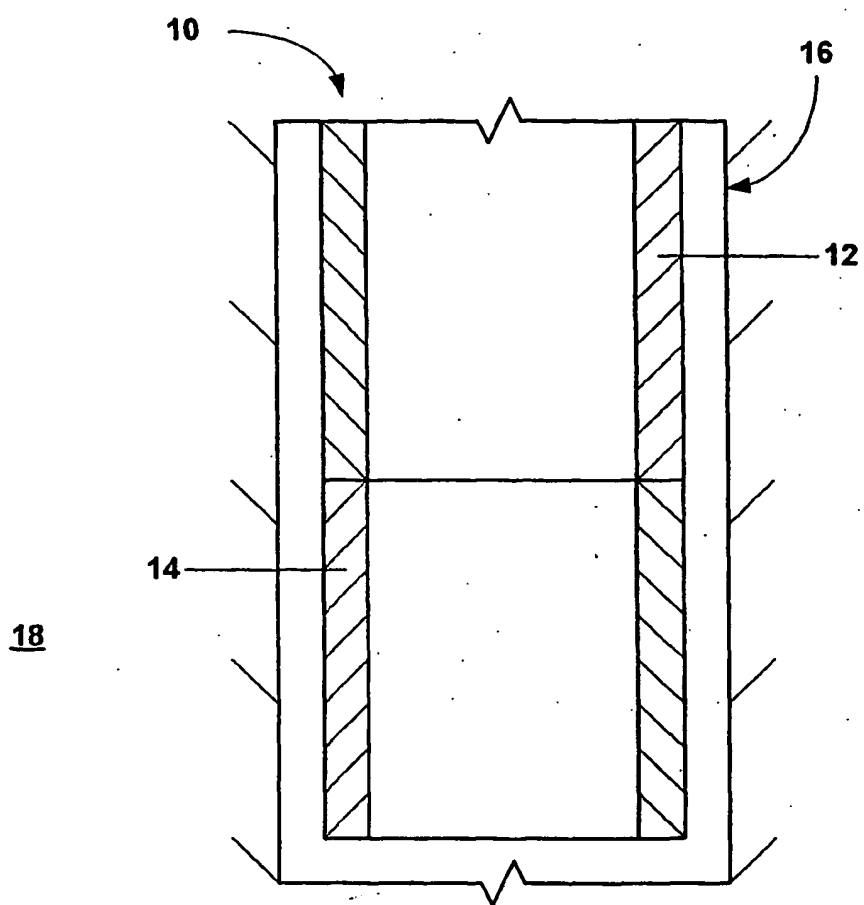


FIG. 1

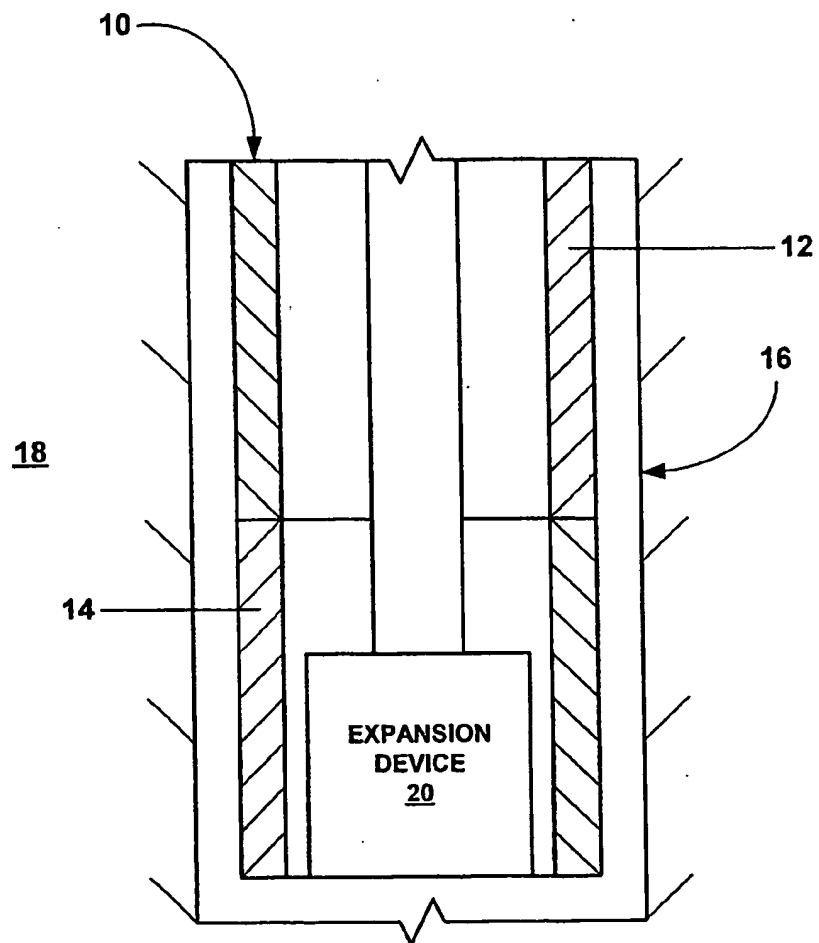


FIG. 2

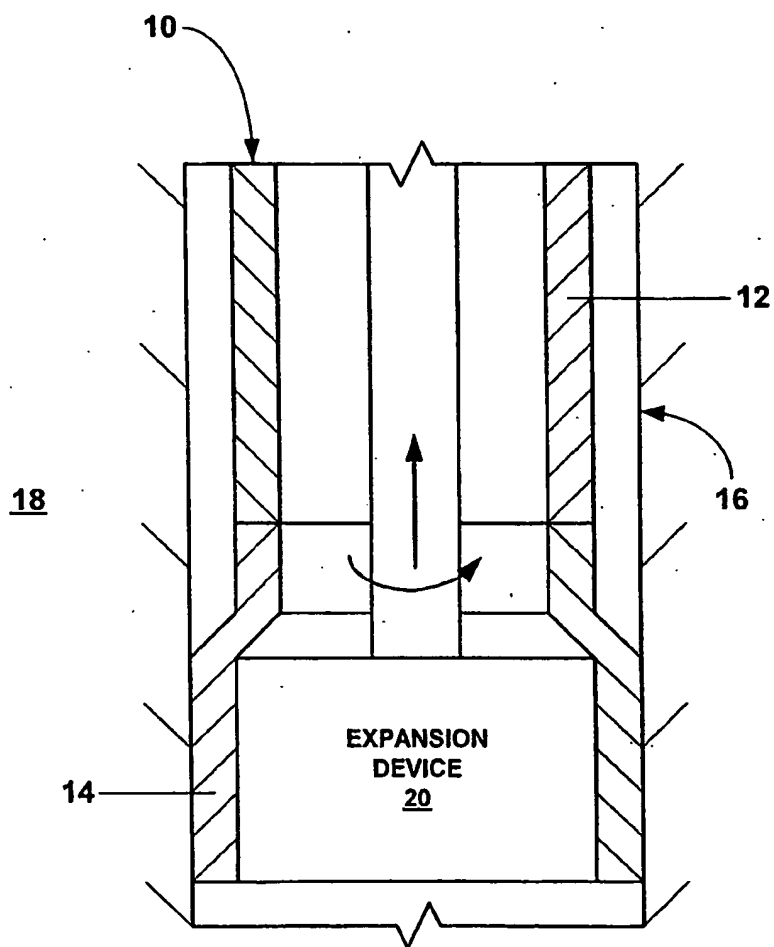


FIG. 3

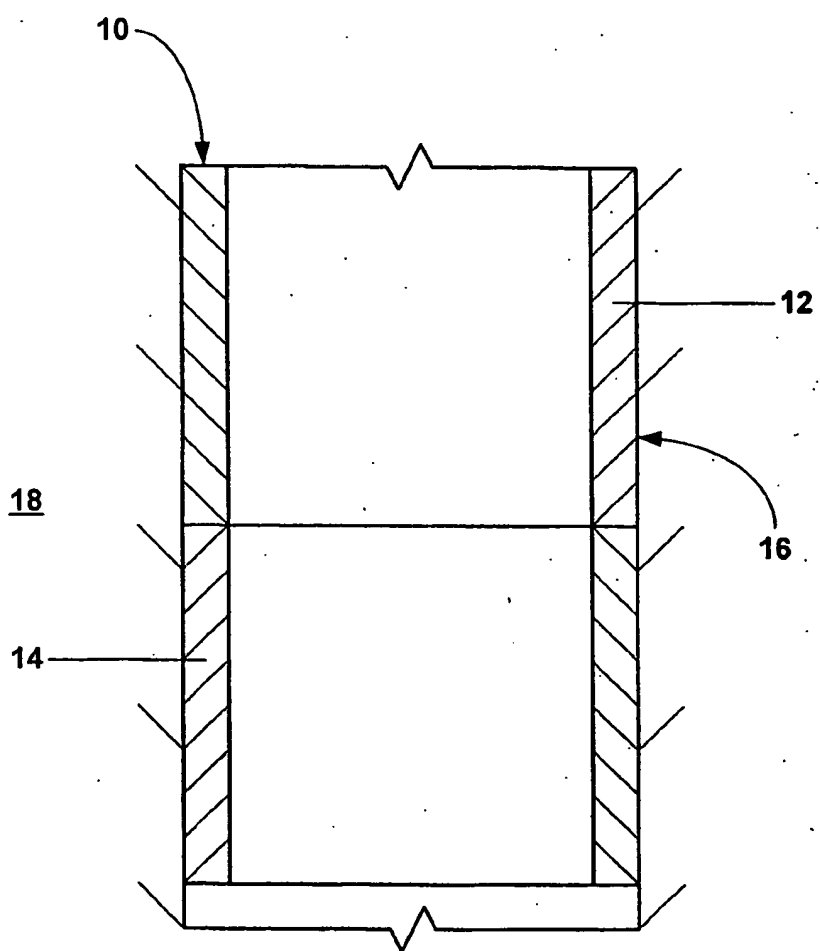


FIG. 4

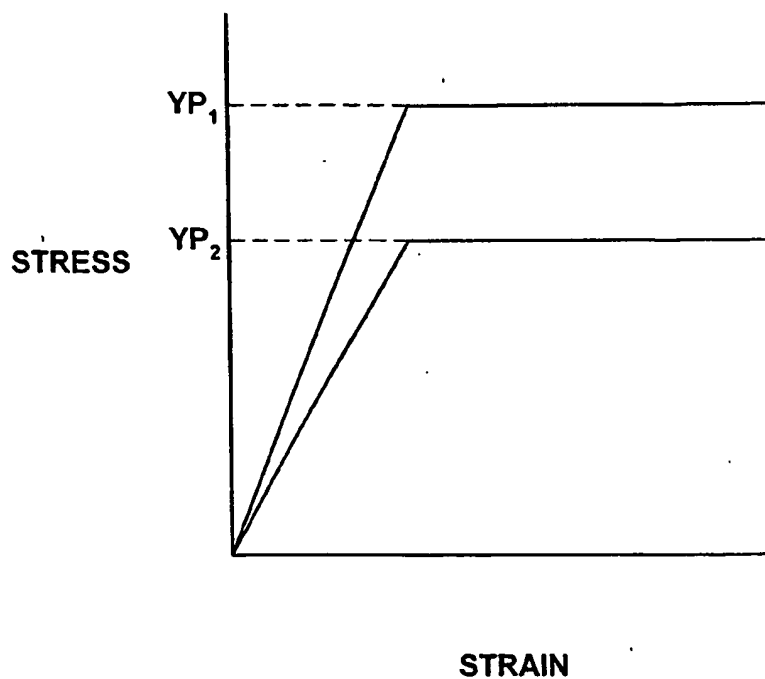


FIG. 5

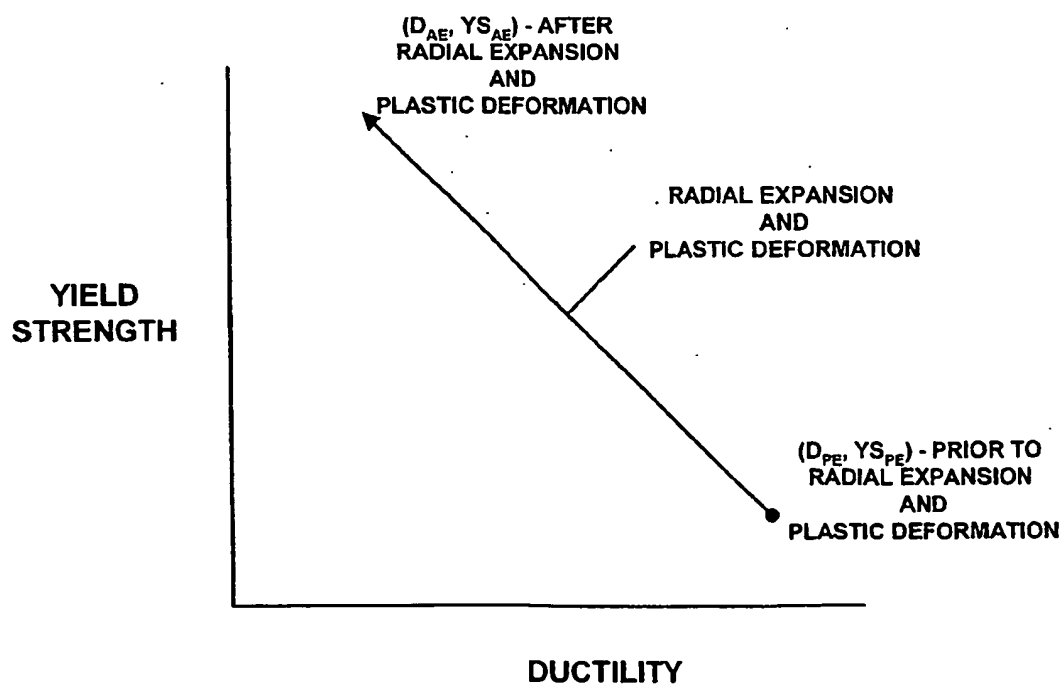


FIG. 6

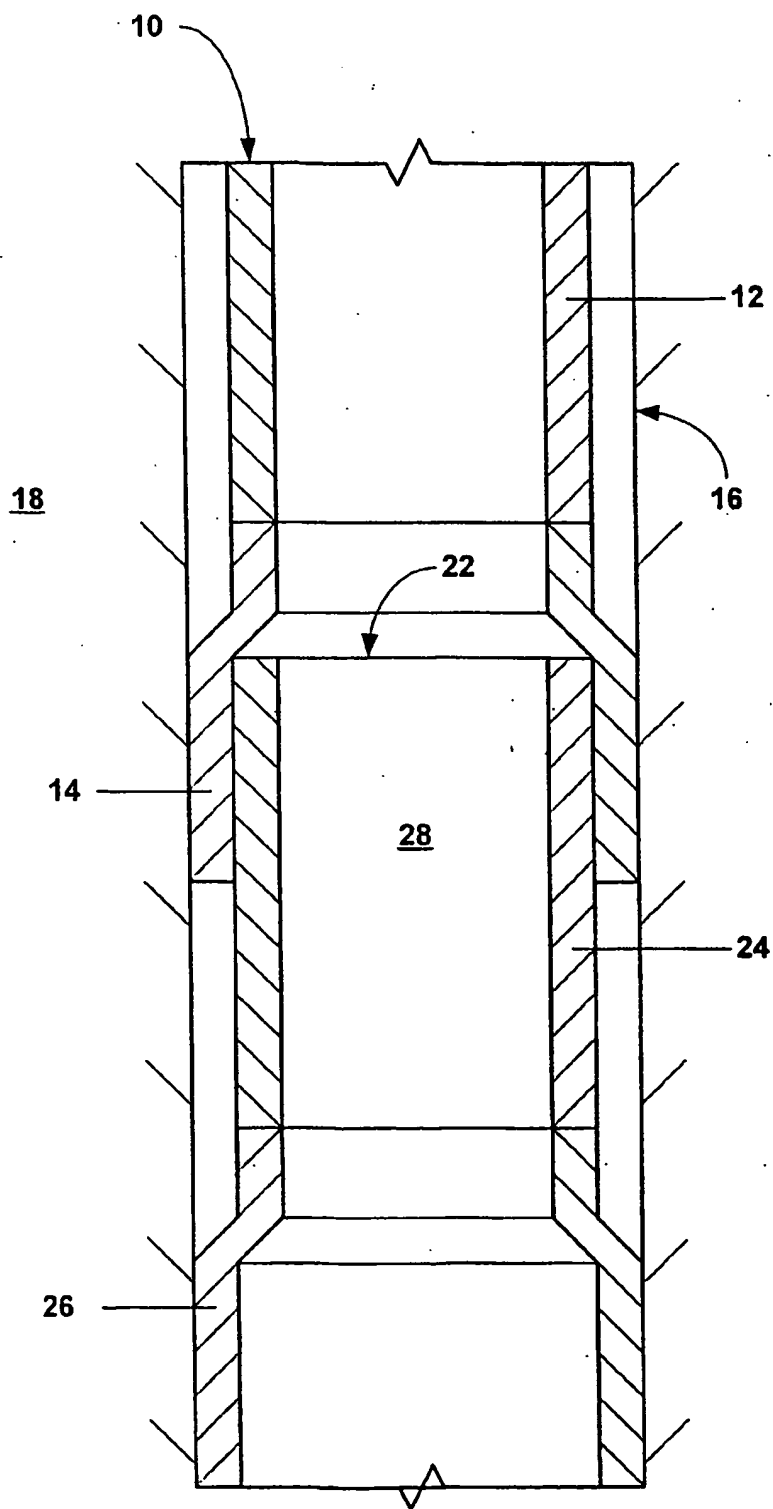


FIG. 7

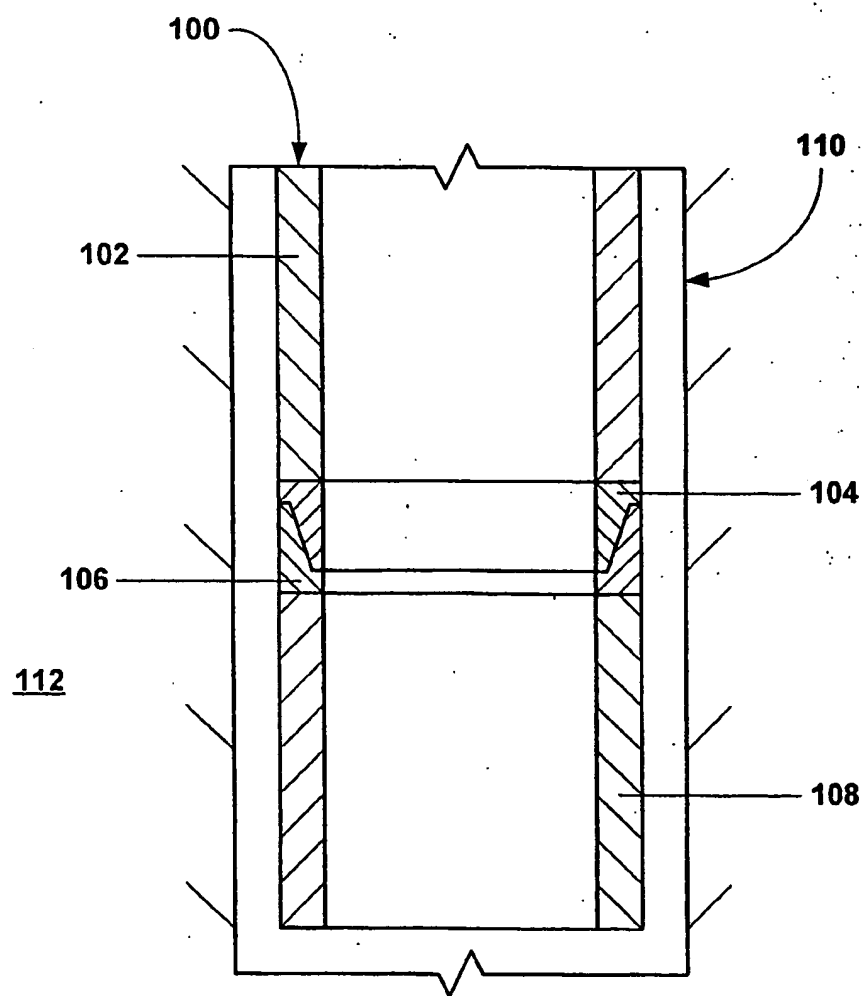


FIG. 8

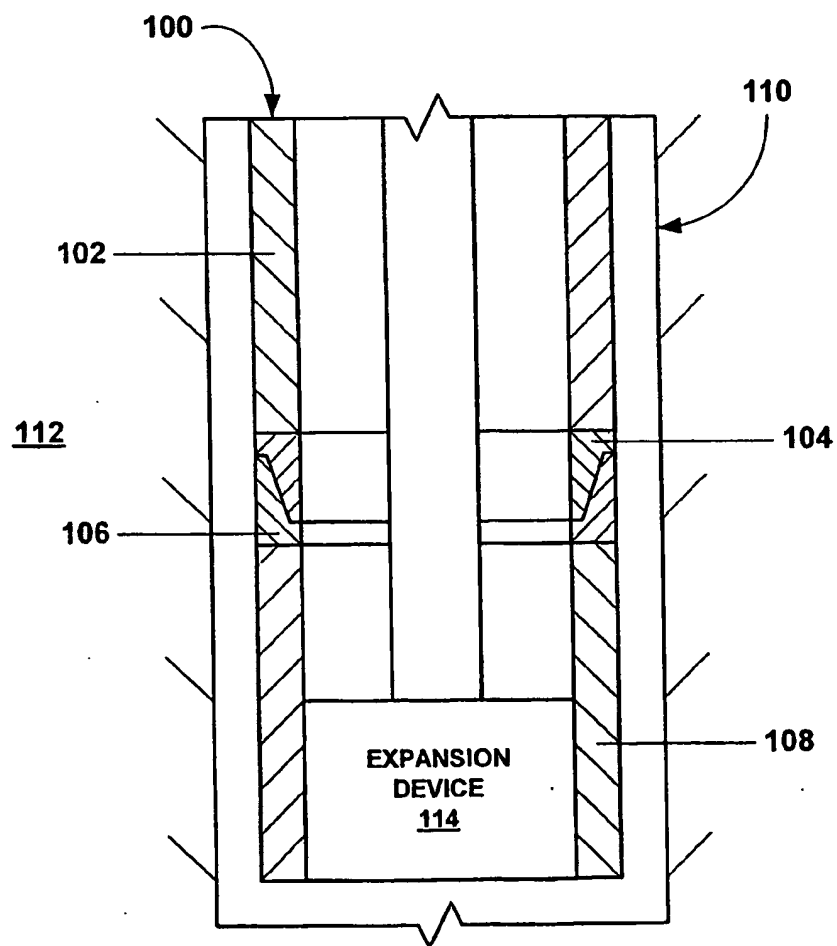


FIG. 9



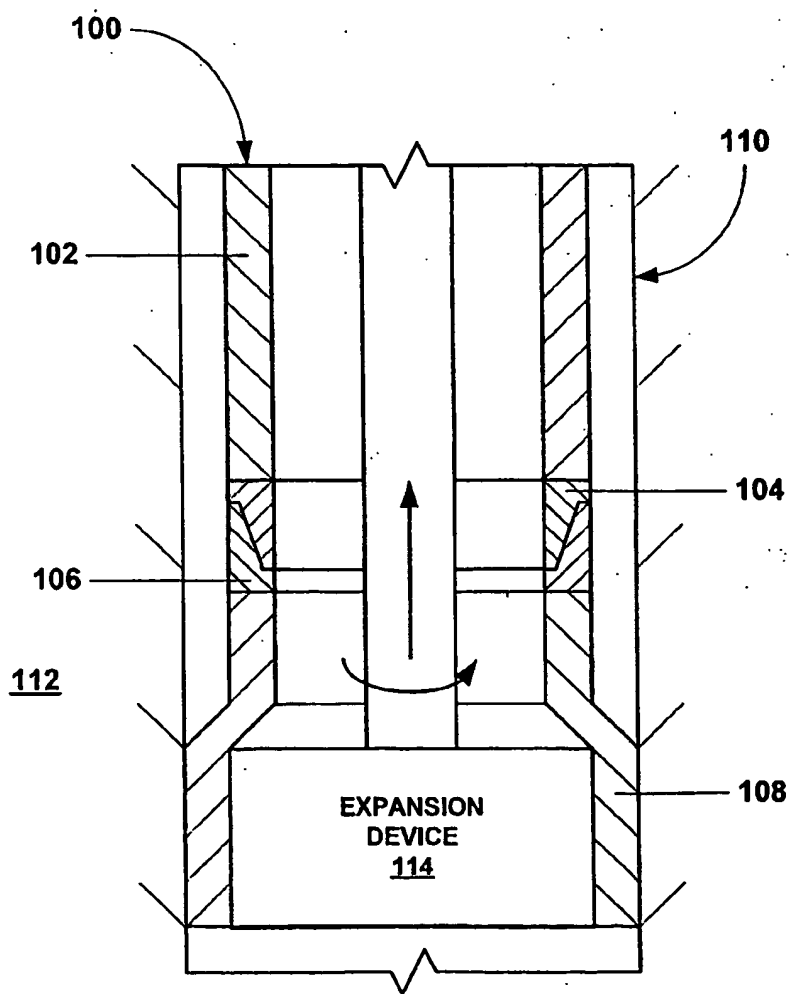


FIG. 10

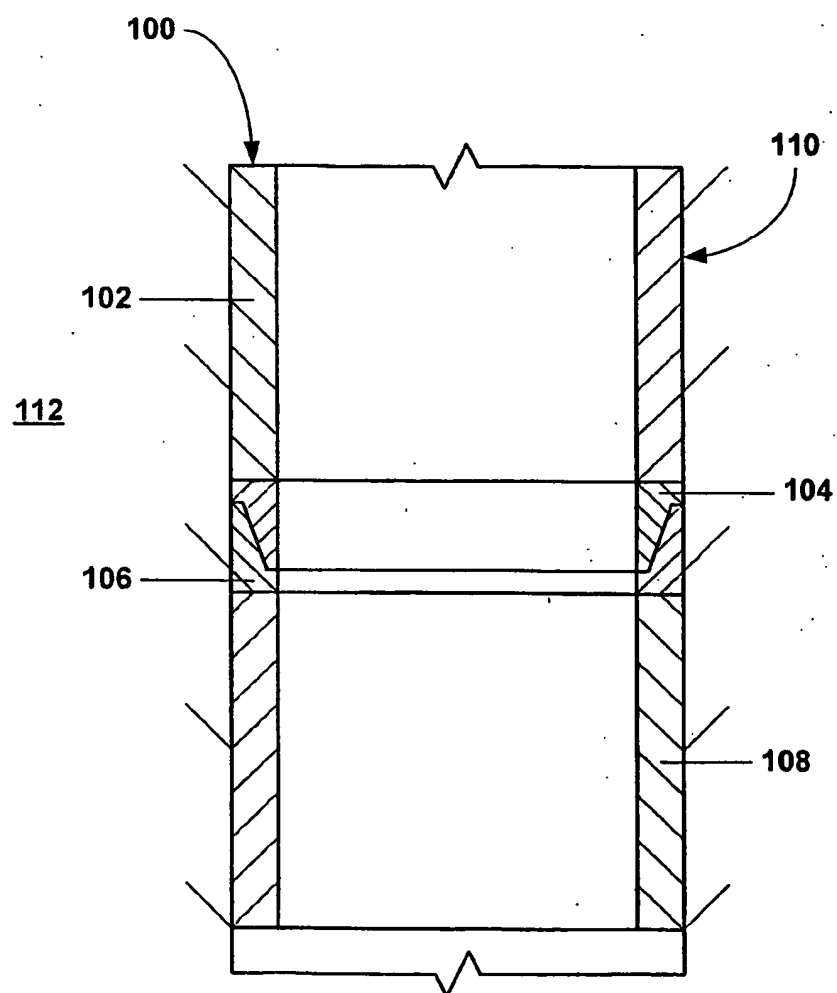


FIG. 11

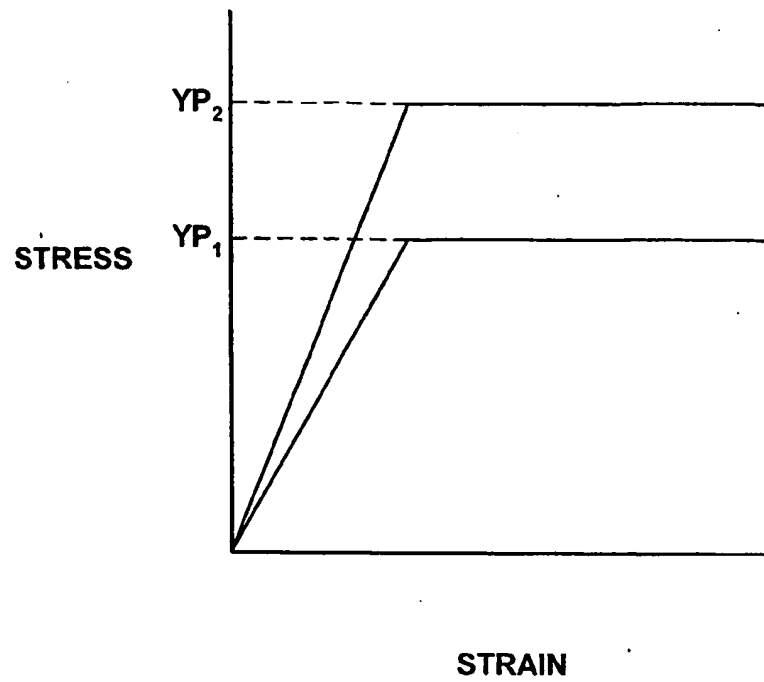


FIG. 12

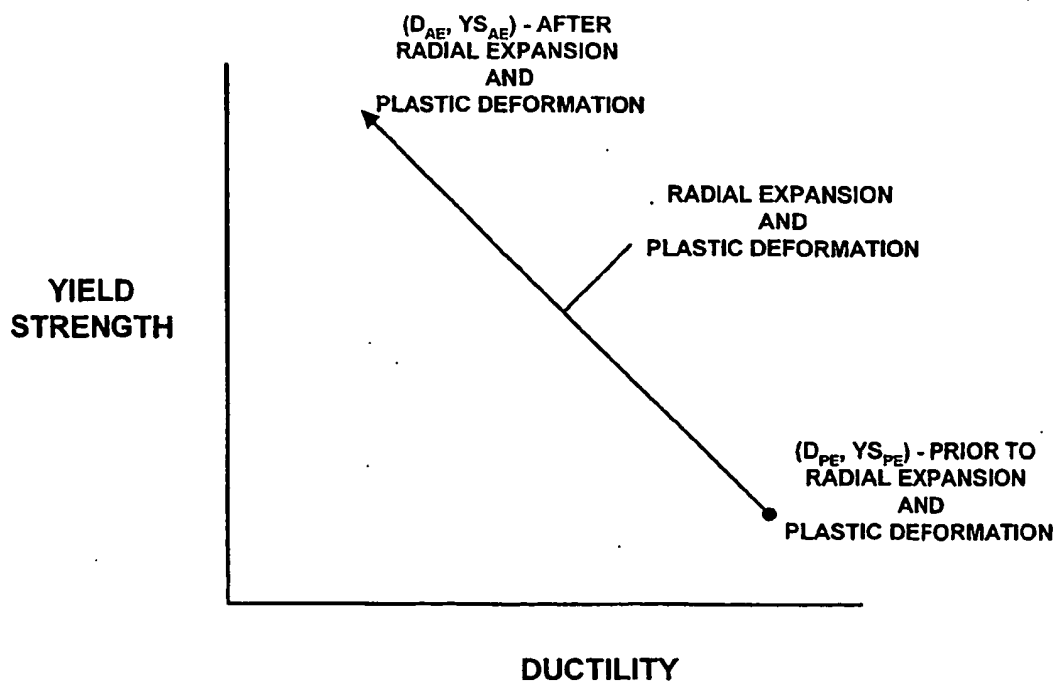


FIG. 13

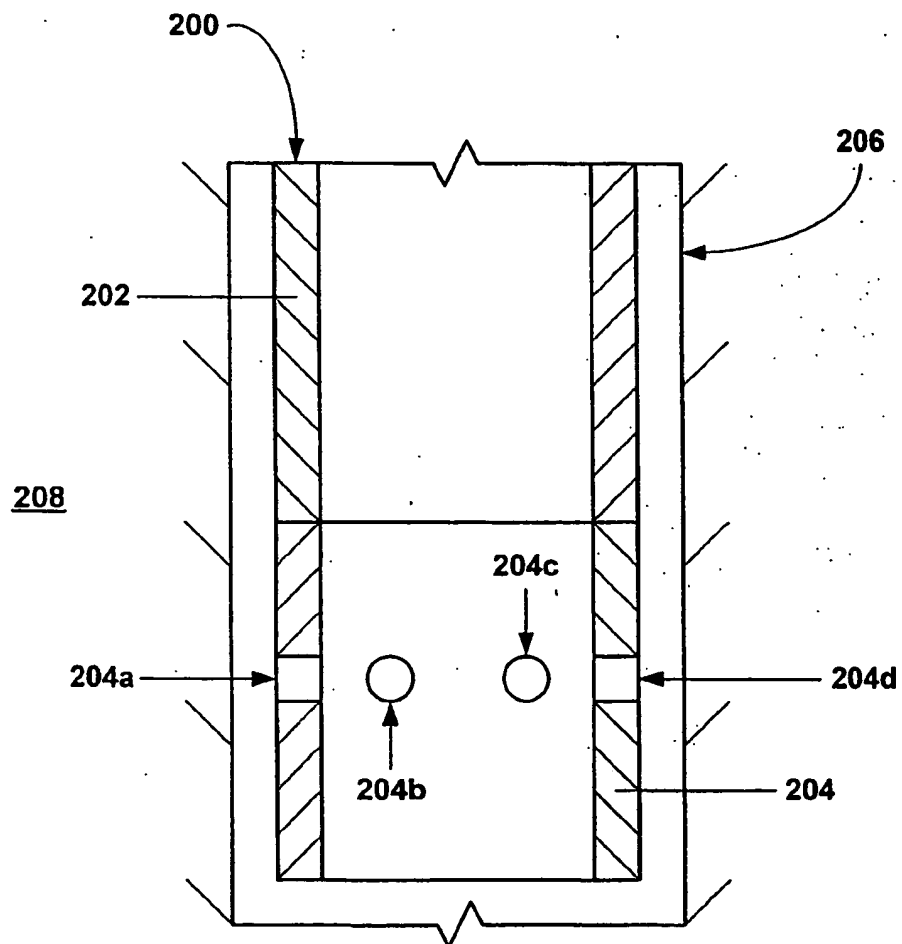


FIG. 14

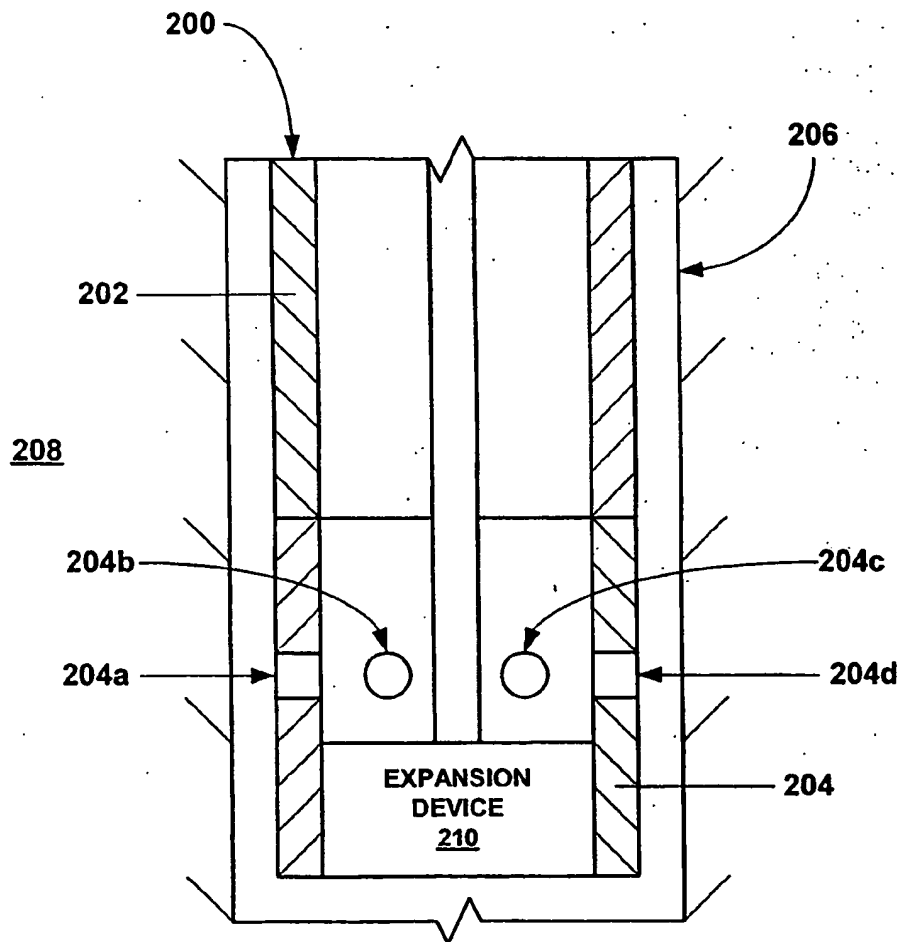


FIG. 15

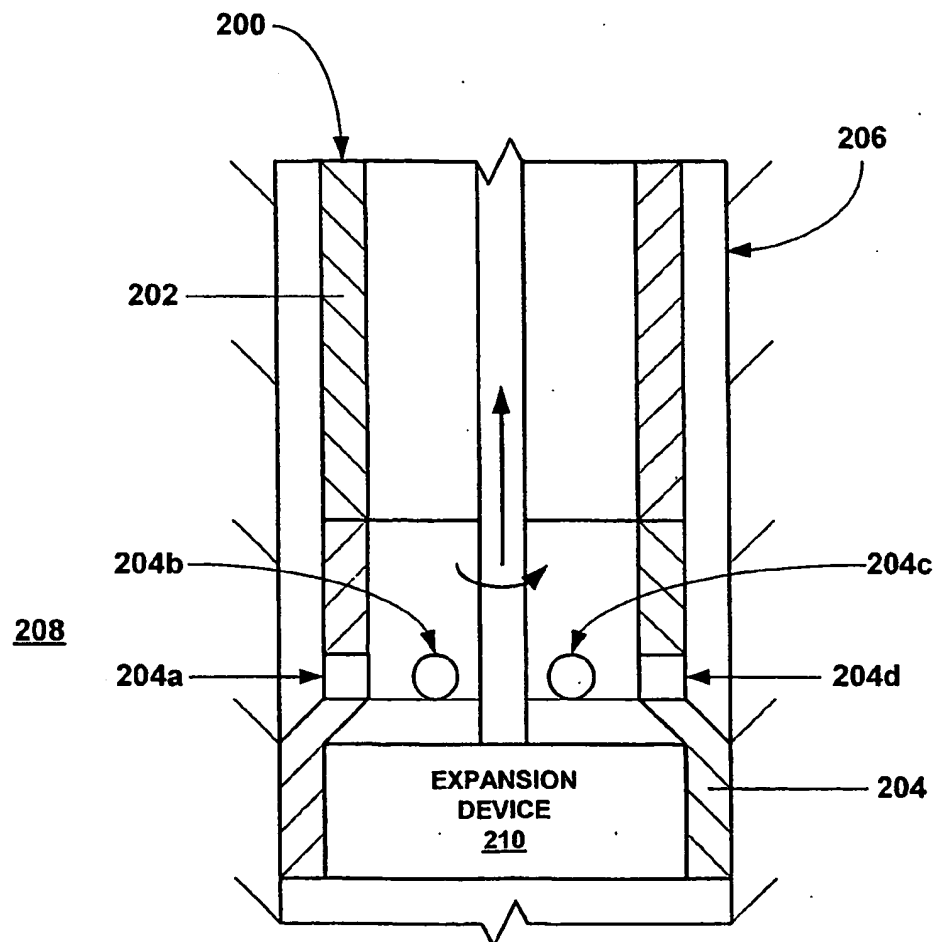


FIG. 16

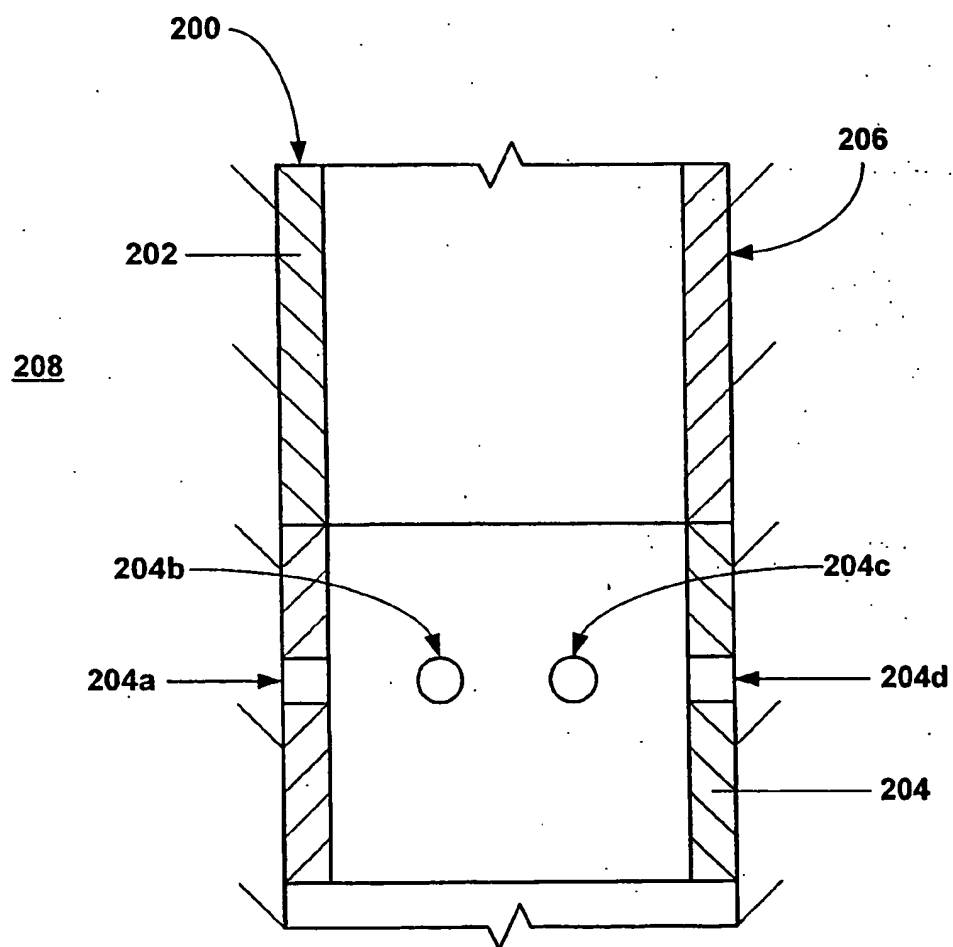


FIG. 17

300

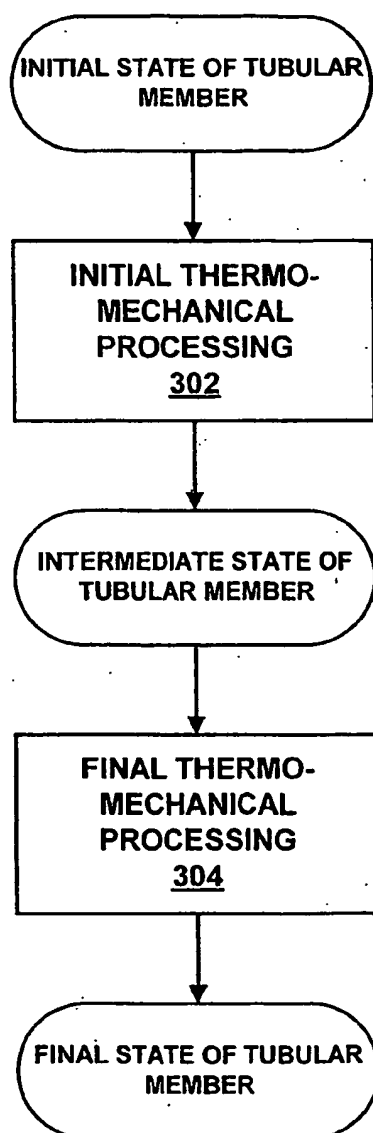


Fig. 18



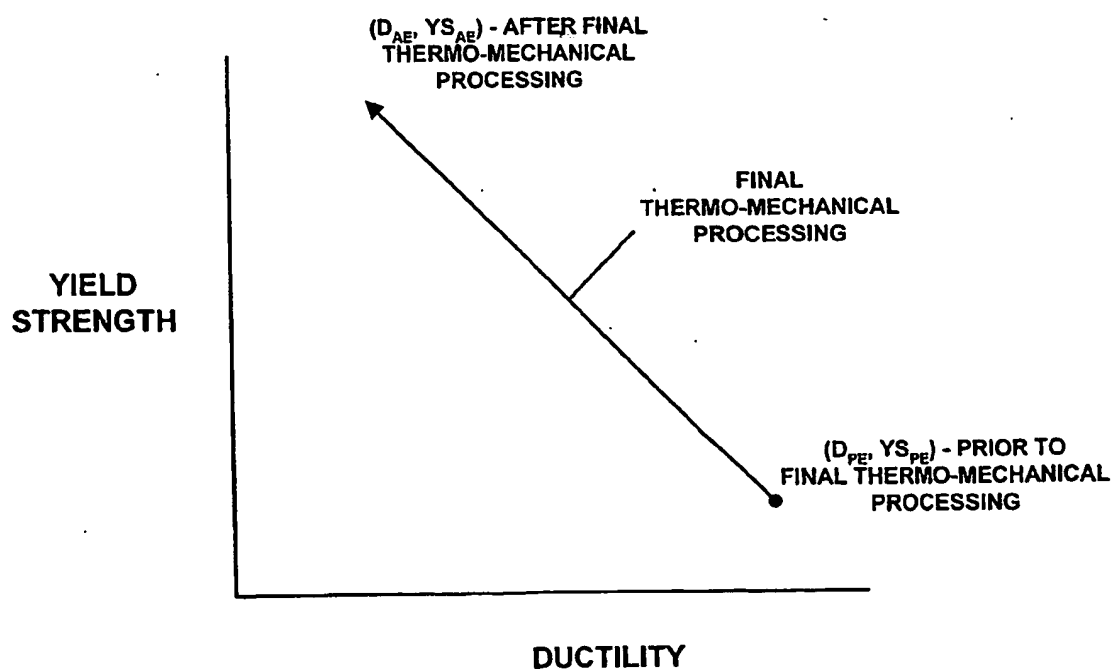


FIG. 19

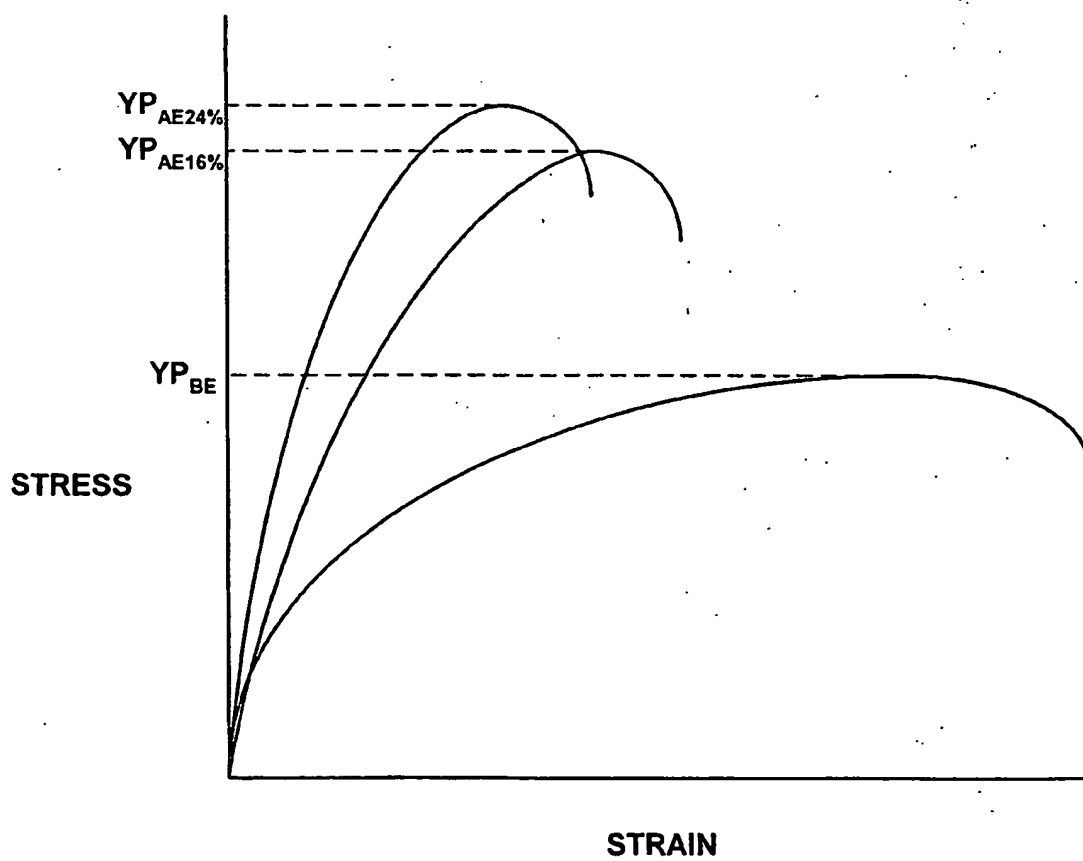


FIG. 20

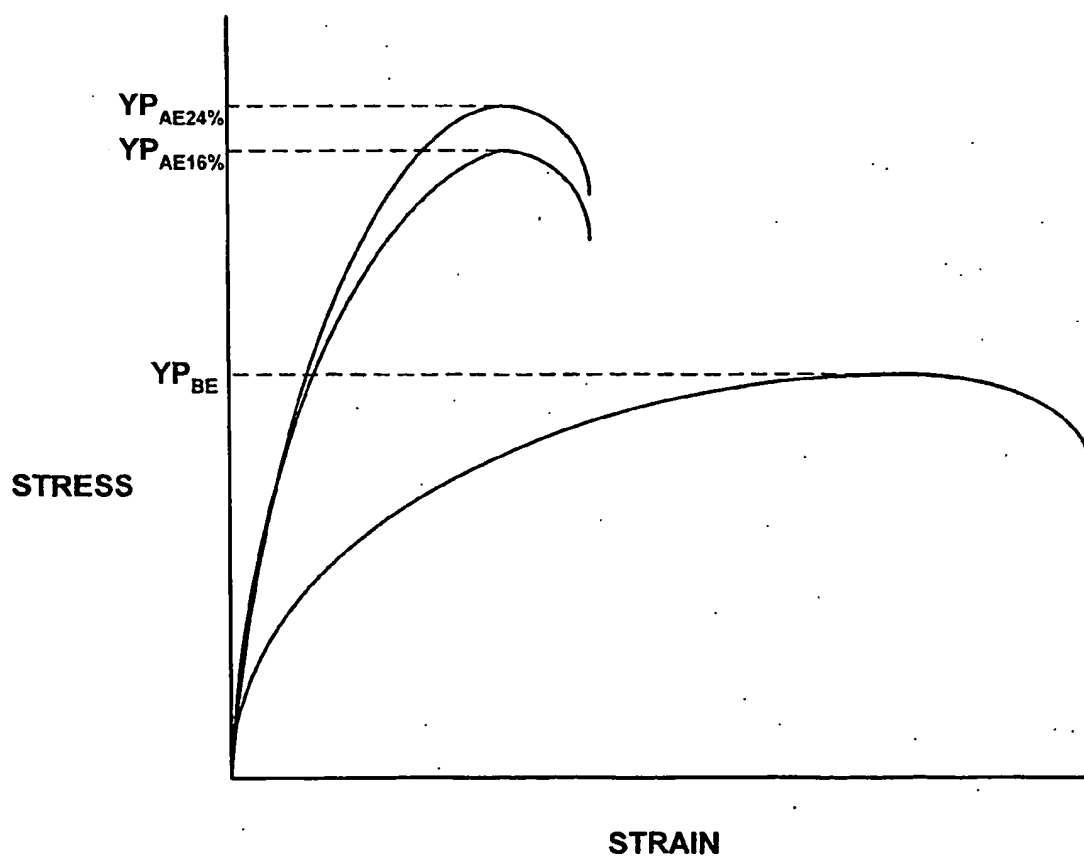


FIG. 21

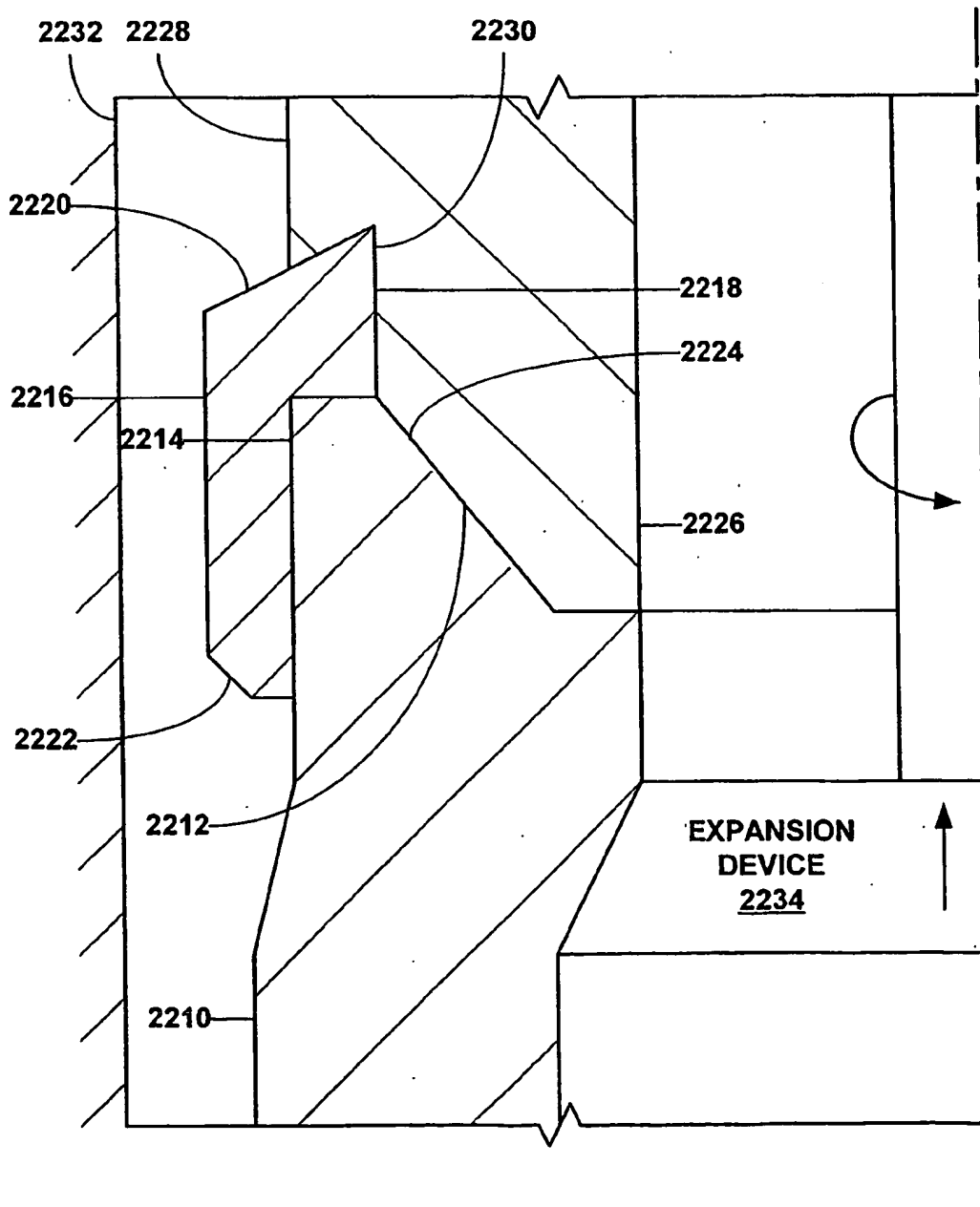


FIG. 22

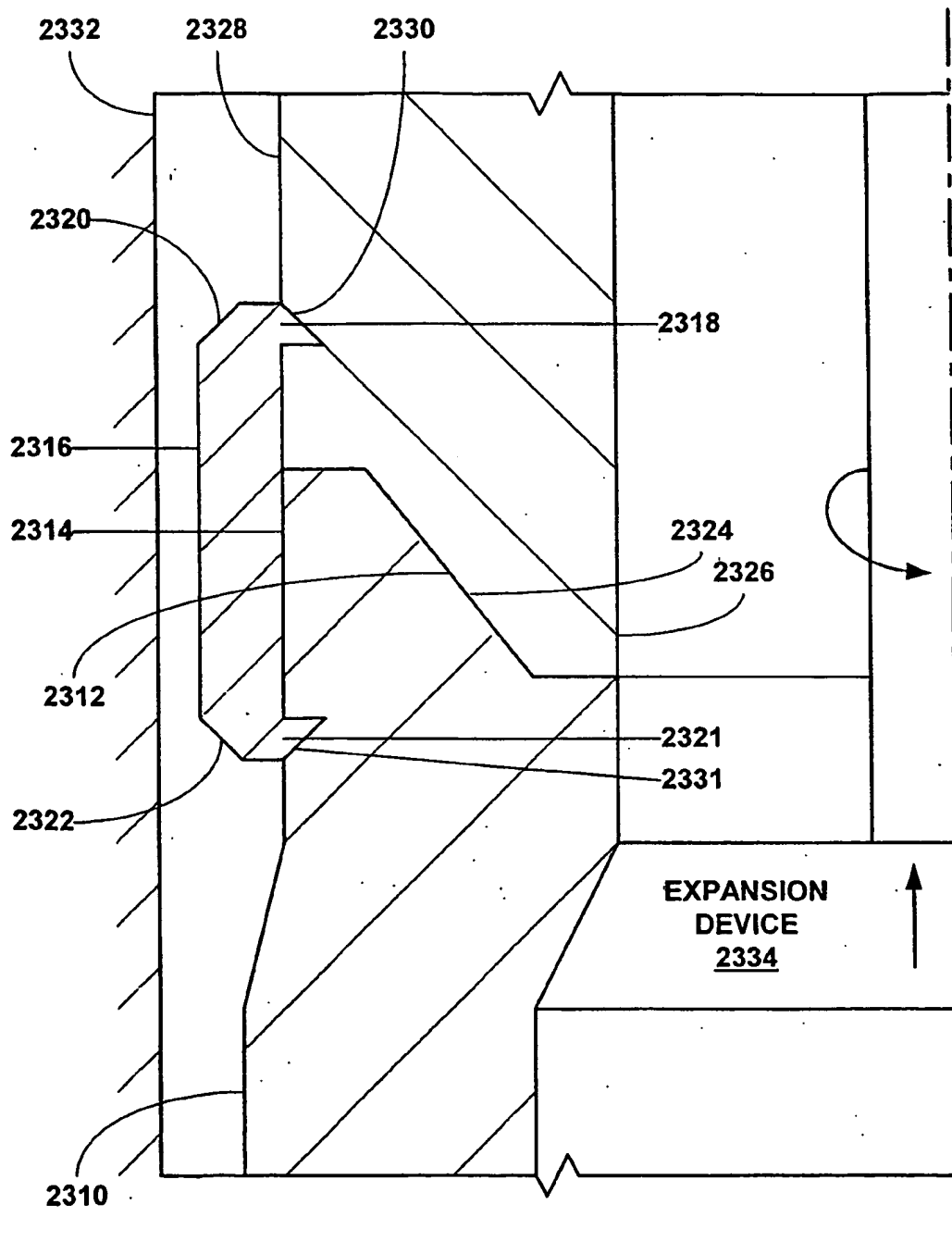


FIG. 23

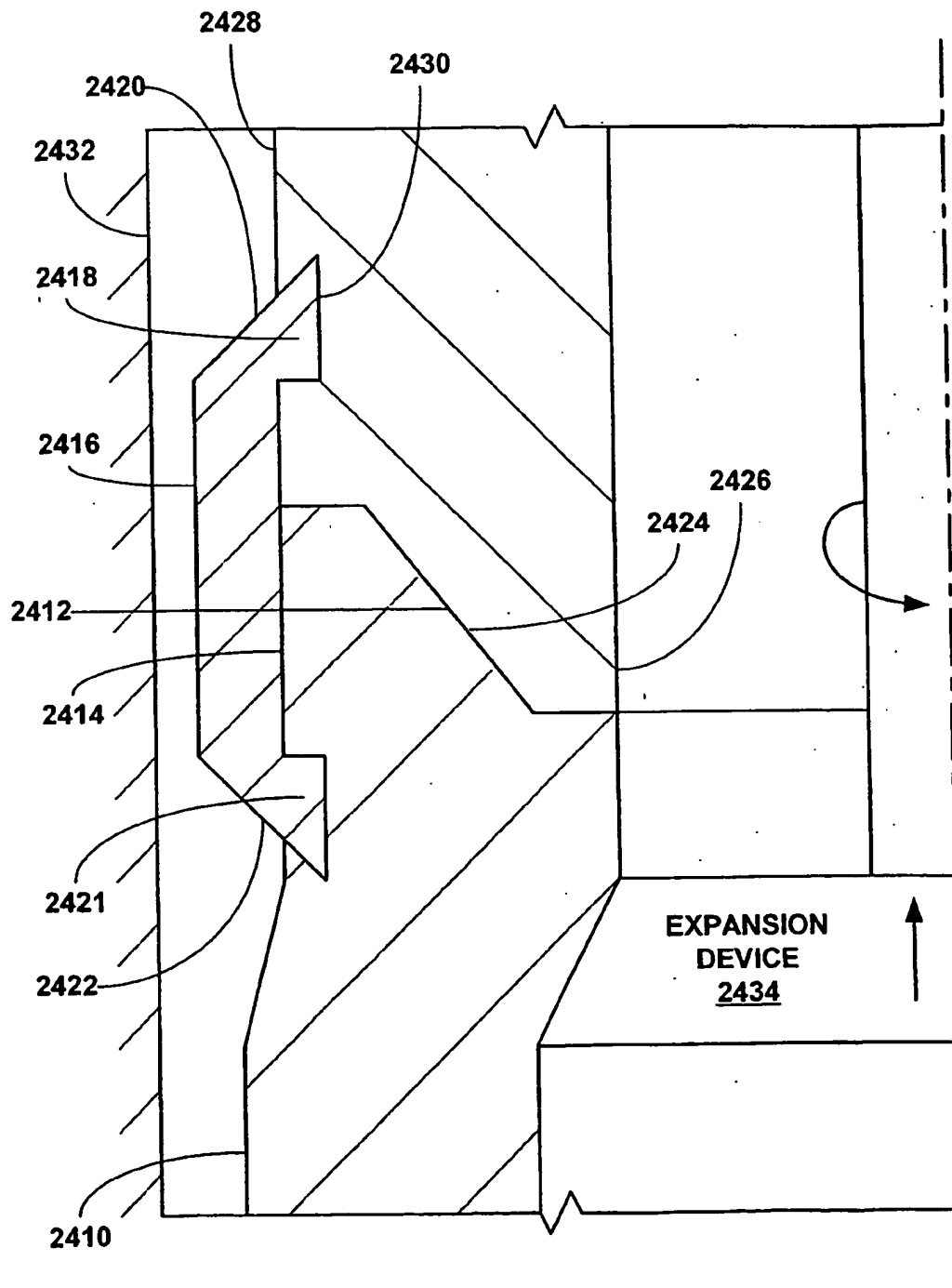


FIG. 24

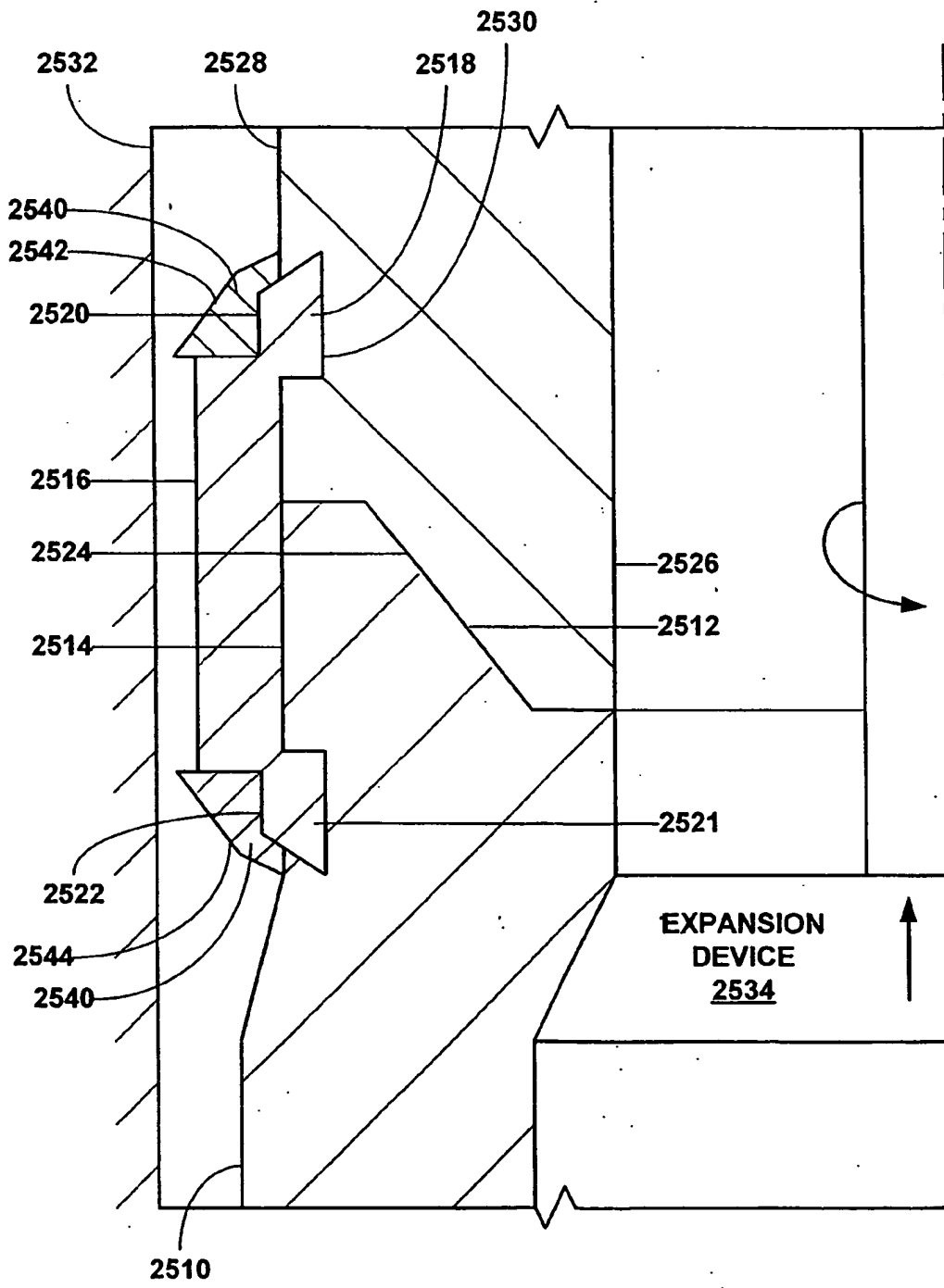


FIG. 25

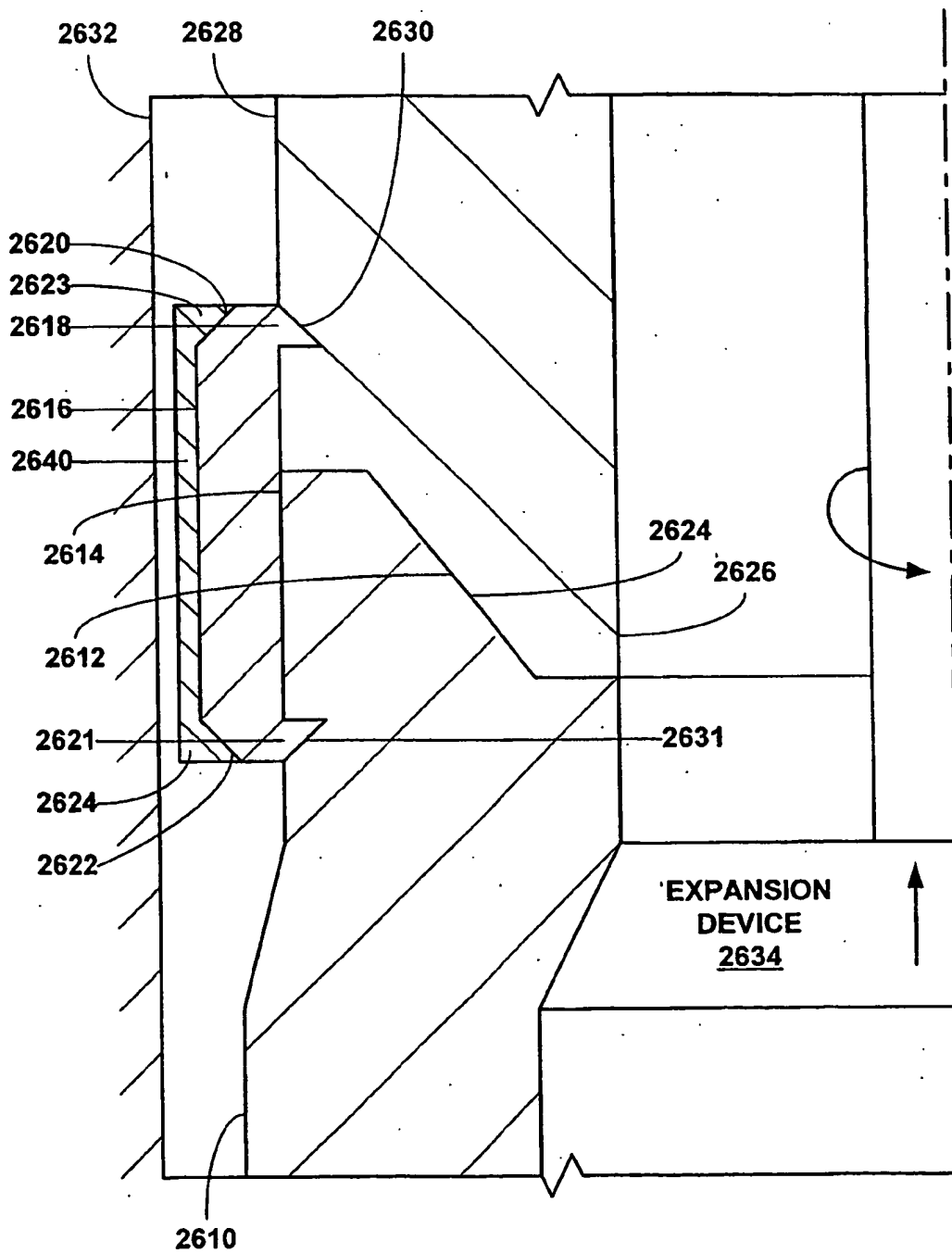


FIG. 26



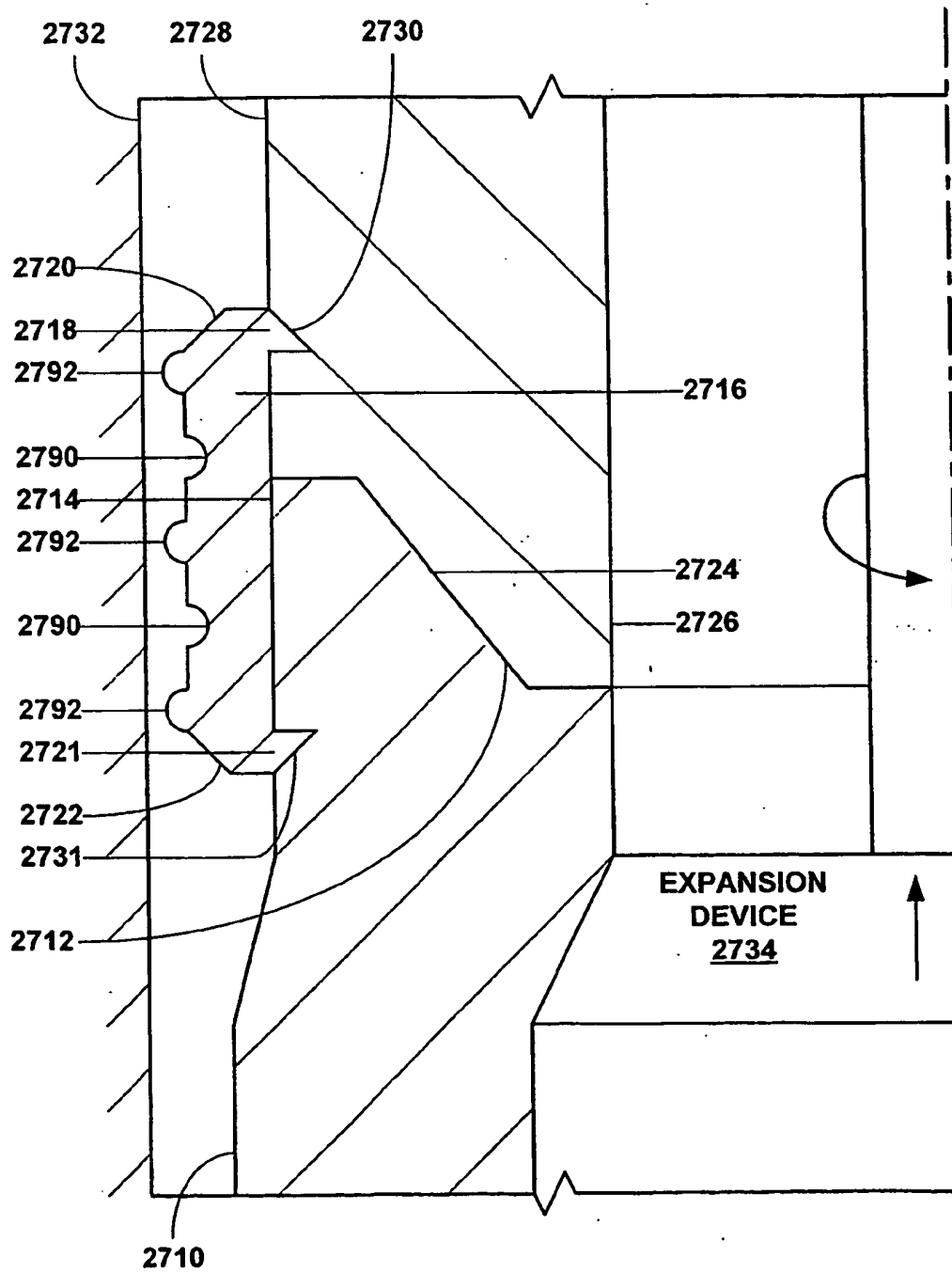


FIG. 27

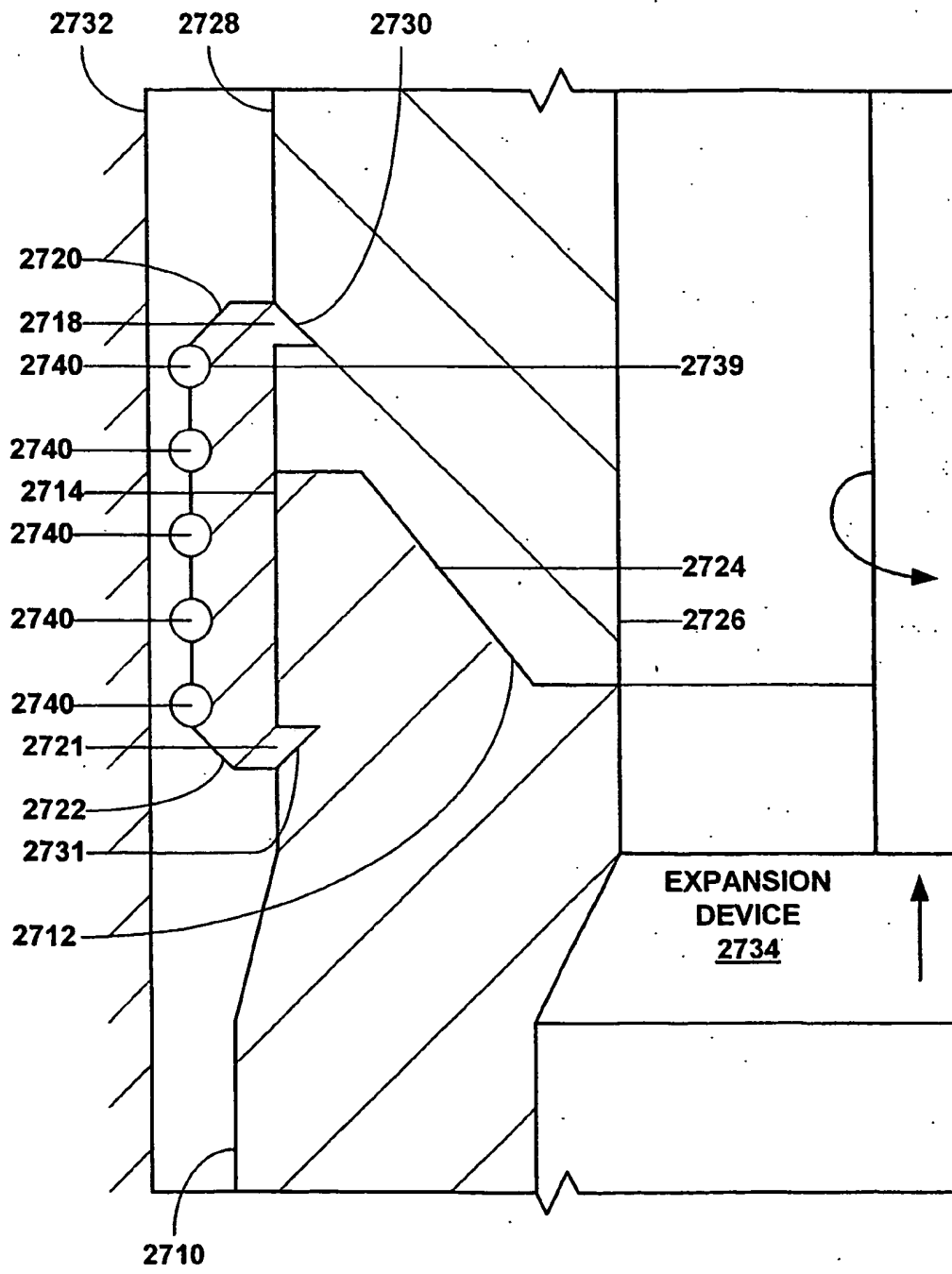


FIG. 28

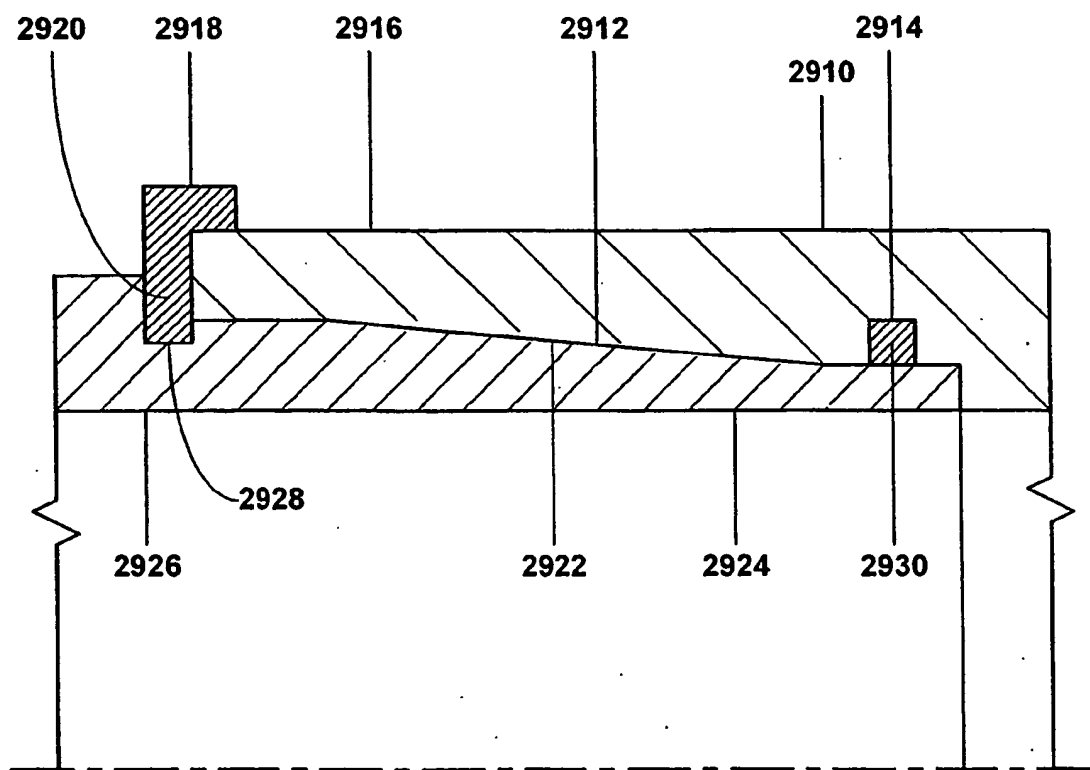


FIG. 29

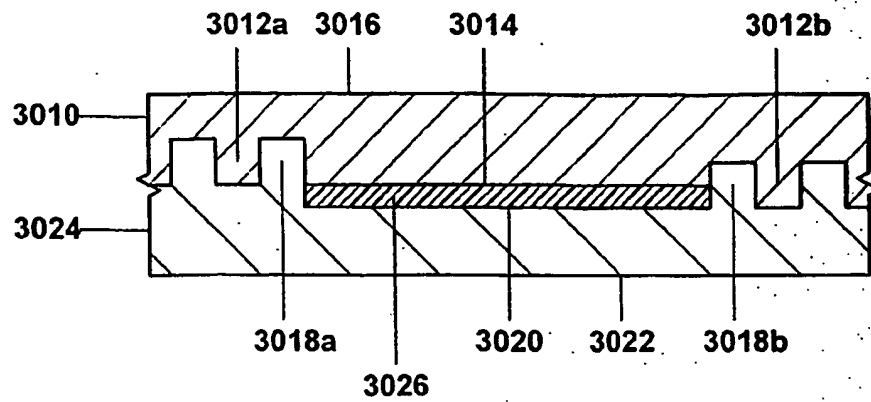


FIG. 30a

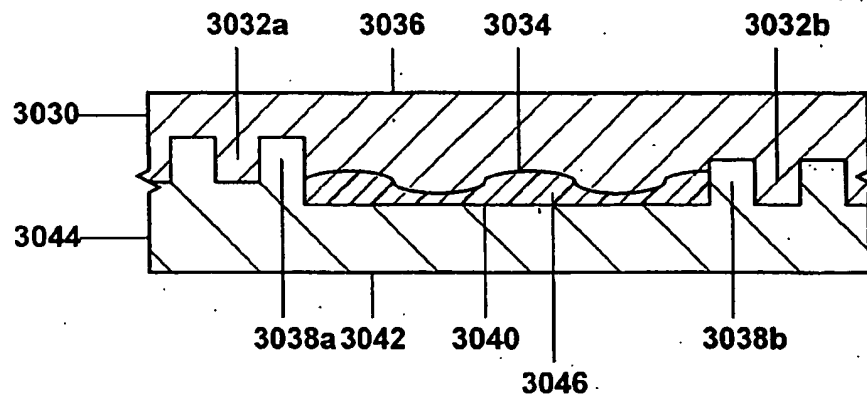


FIG. 30b

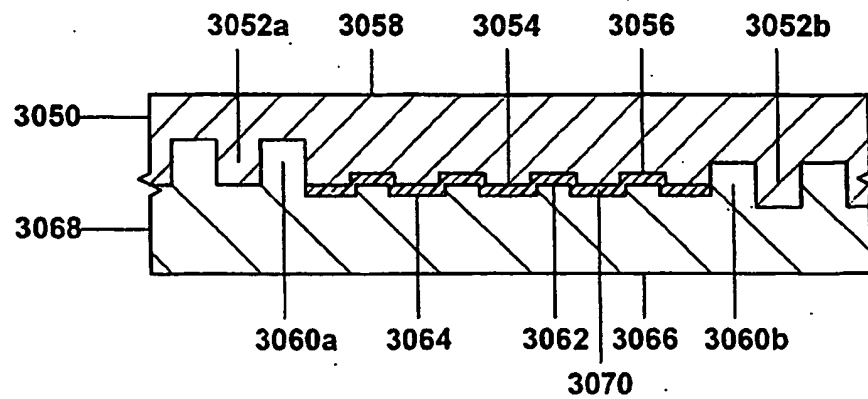


FIG. 30c

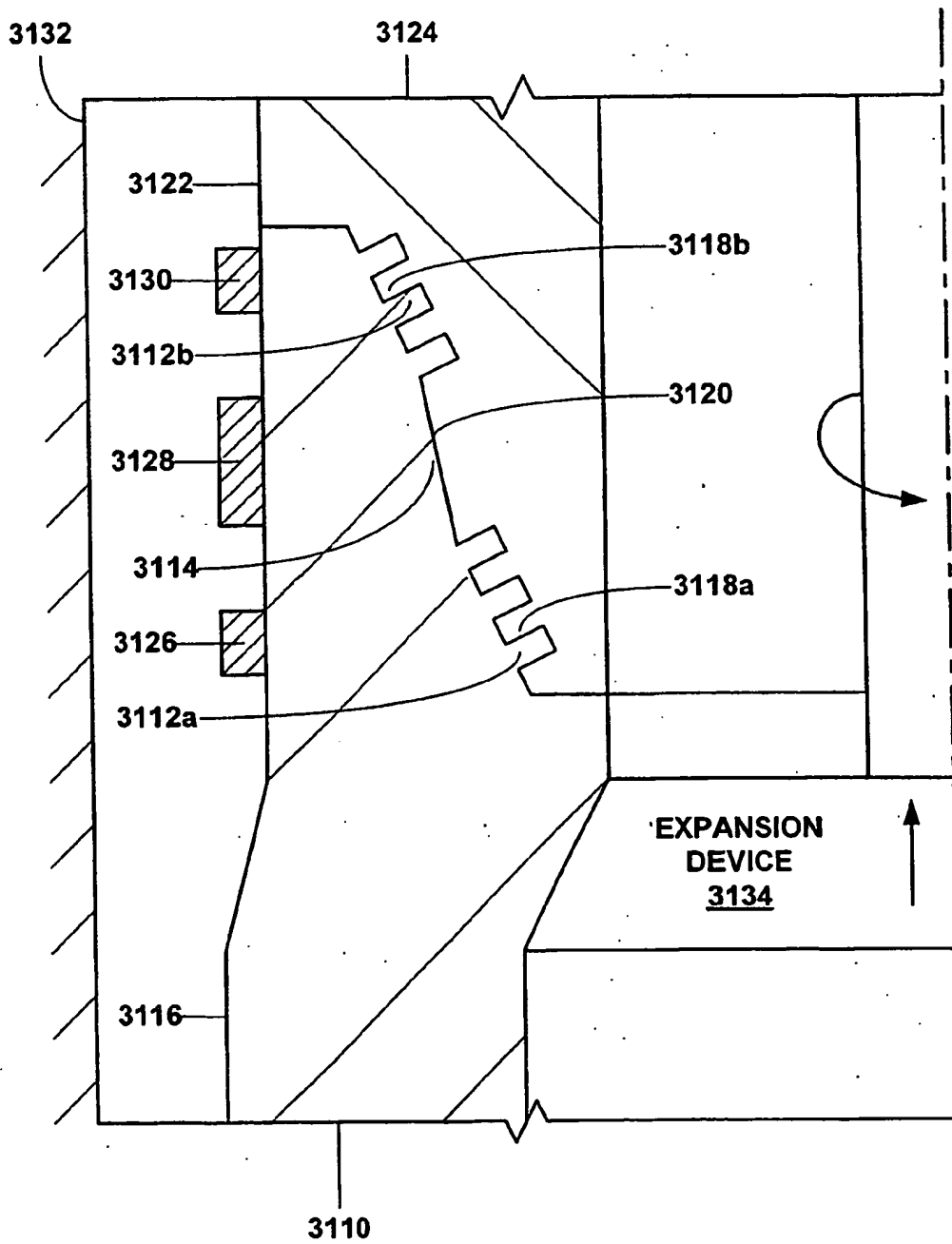


FIG. 31

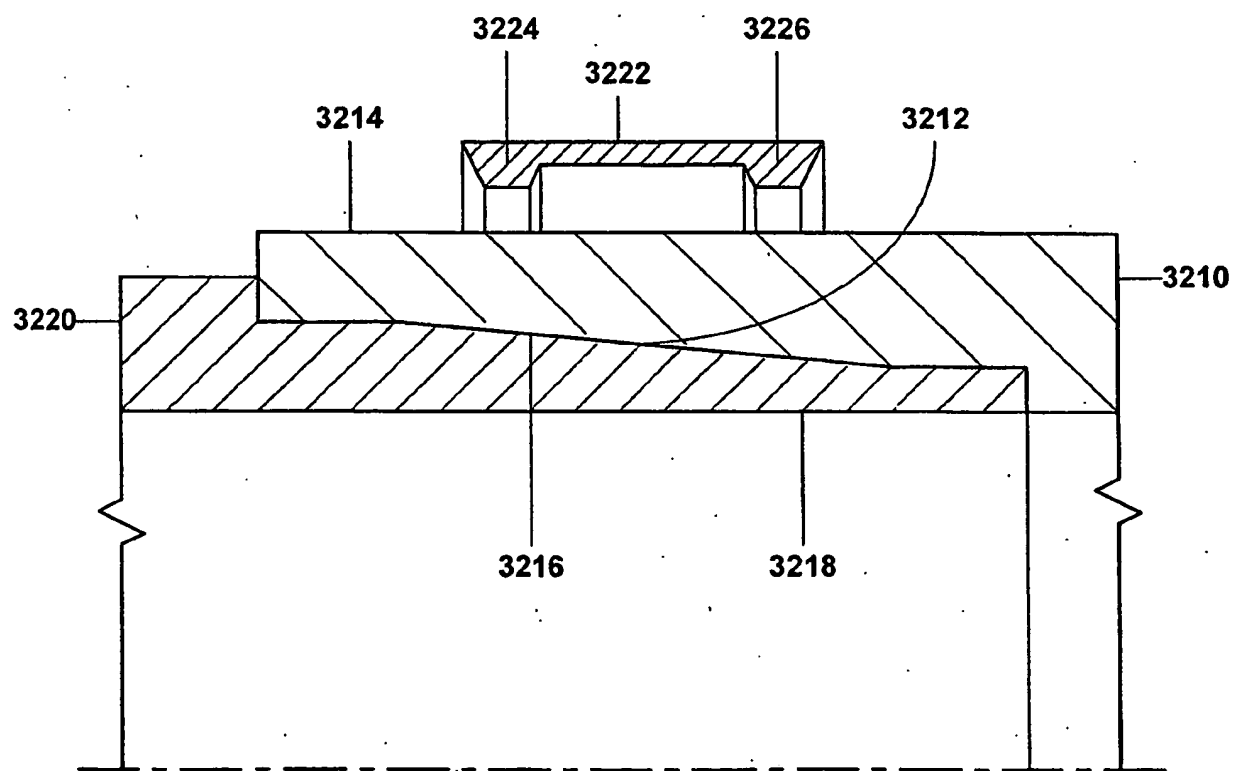


FIG. 32a

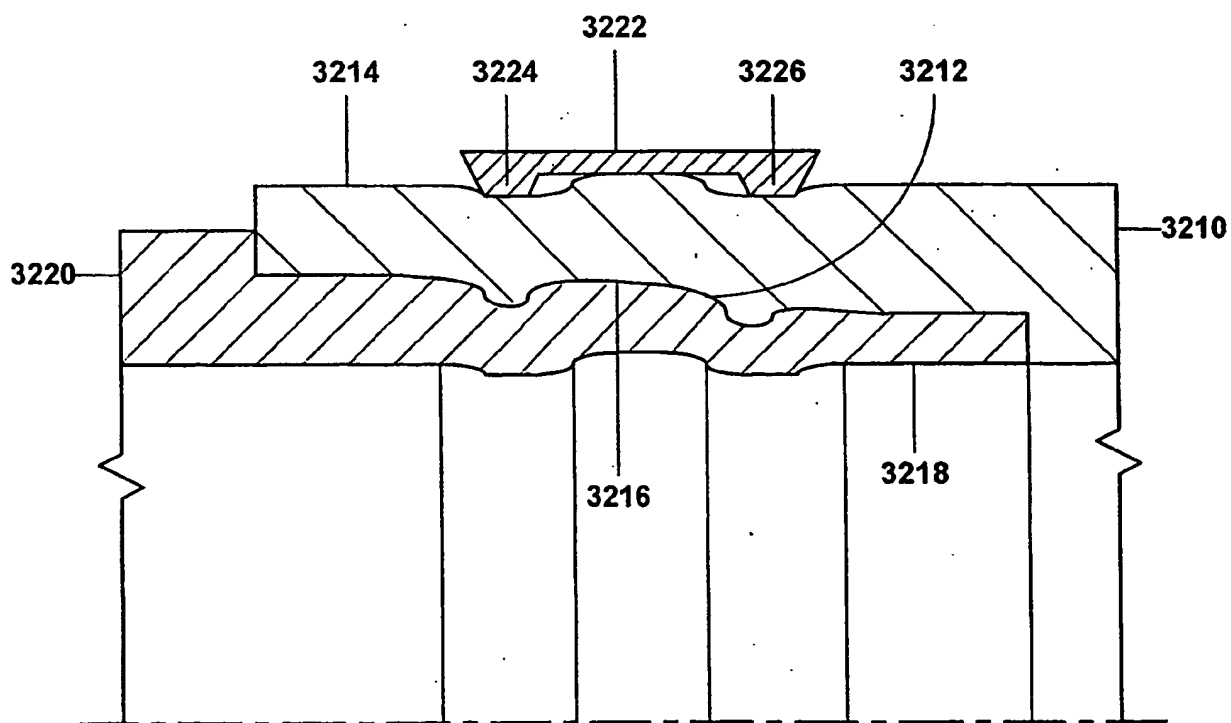


FIG. 32b

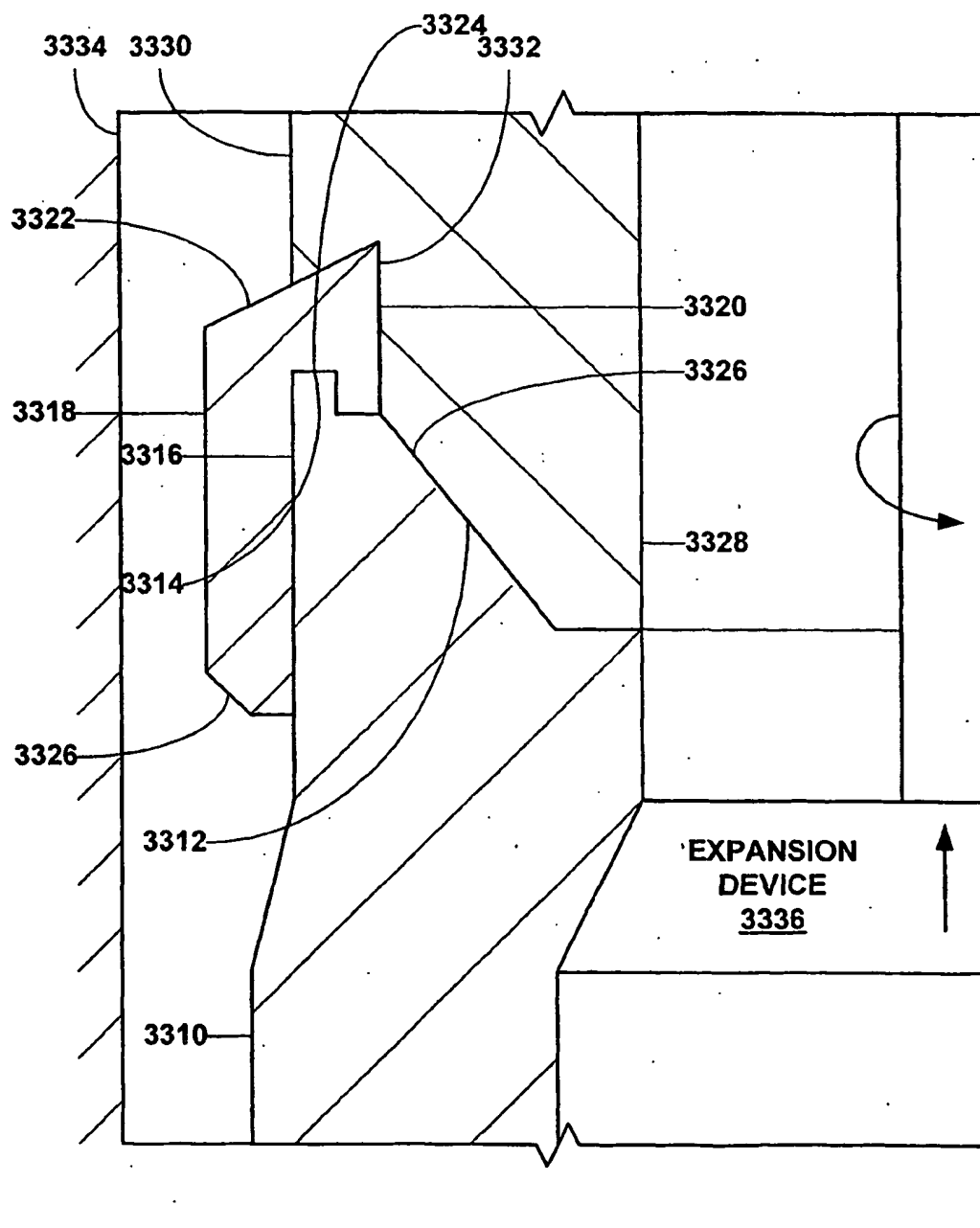


FIG. 33





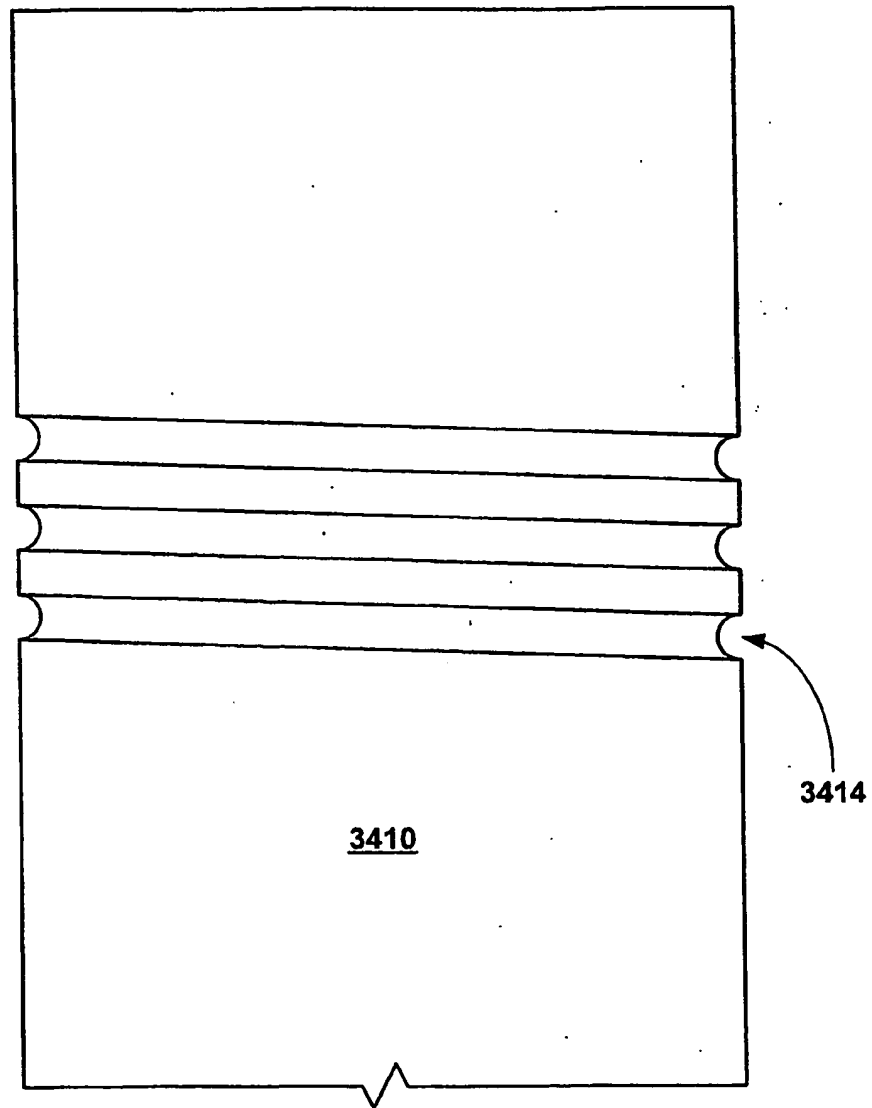


Fig. 34b

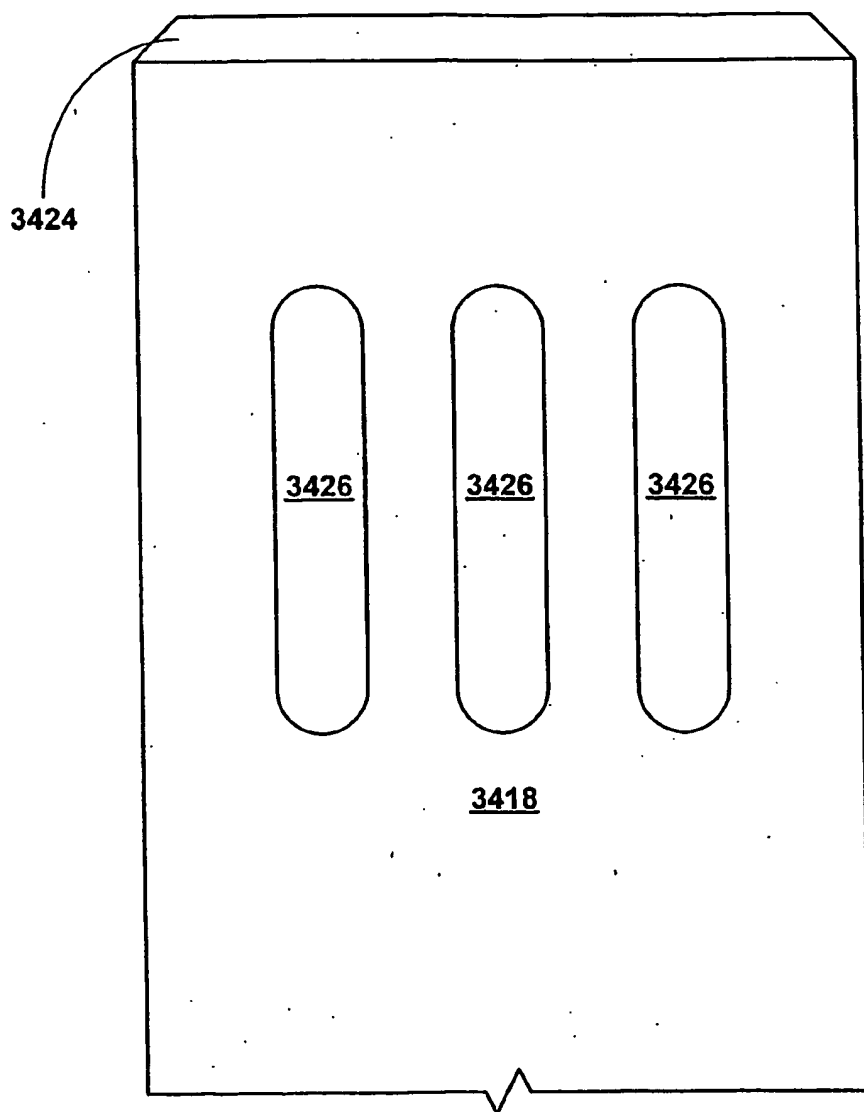


Fig. 34c

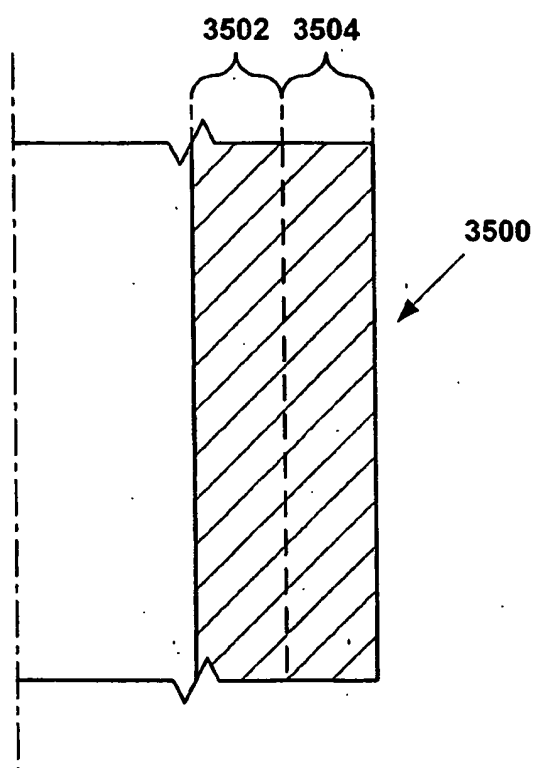


FIG. 35a

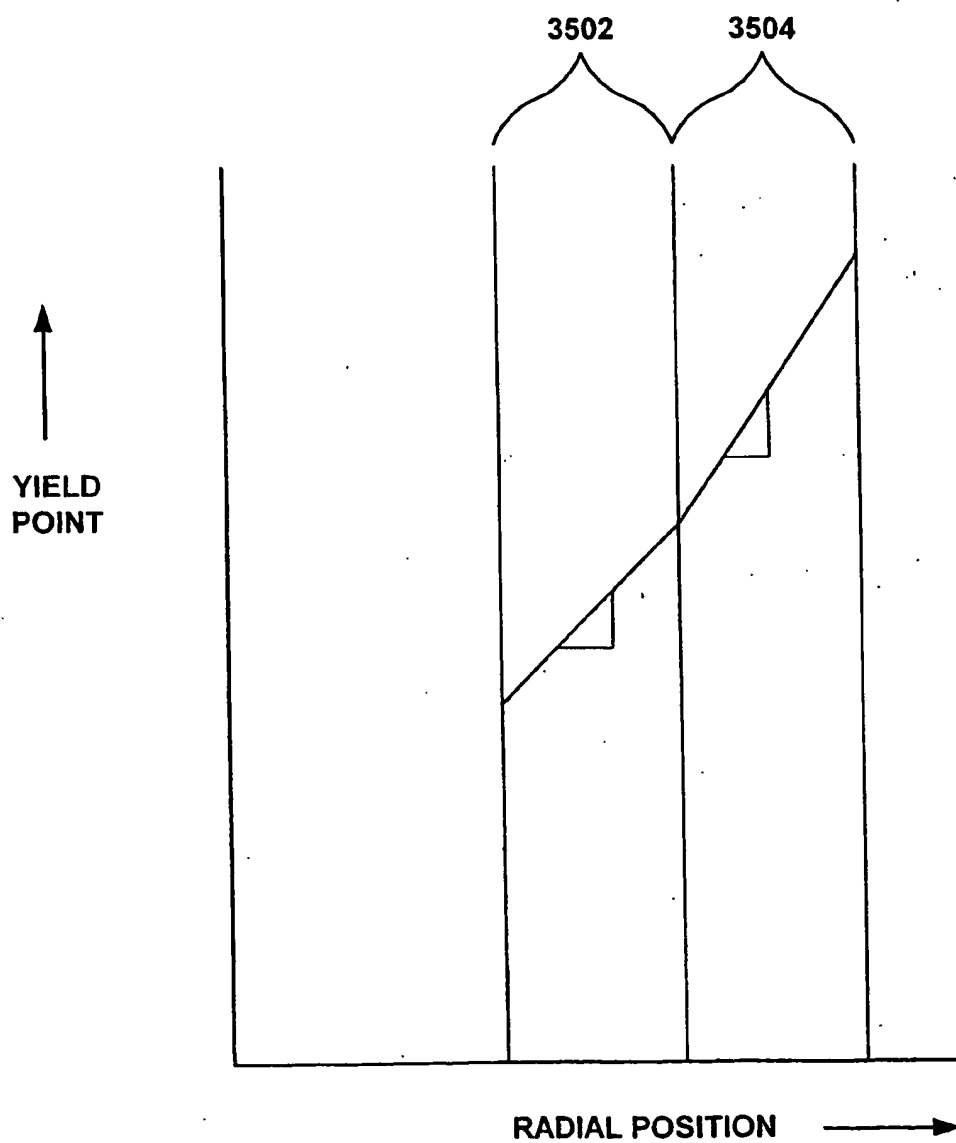


FIG. 35b

3600

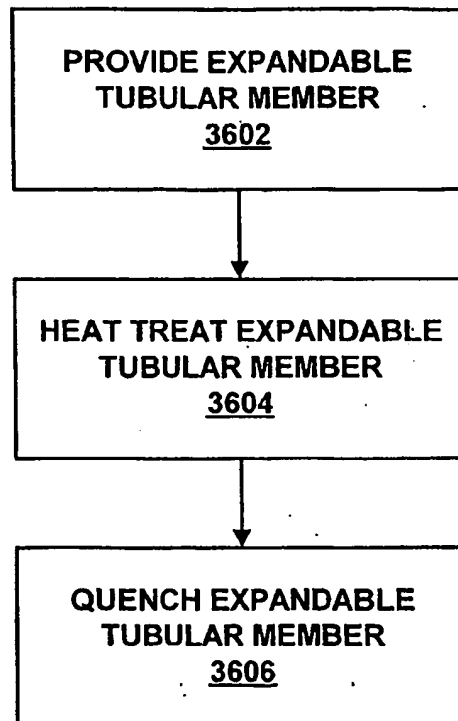


FIG. 36a

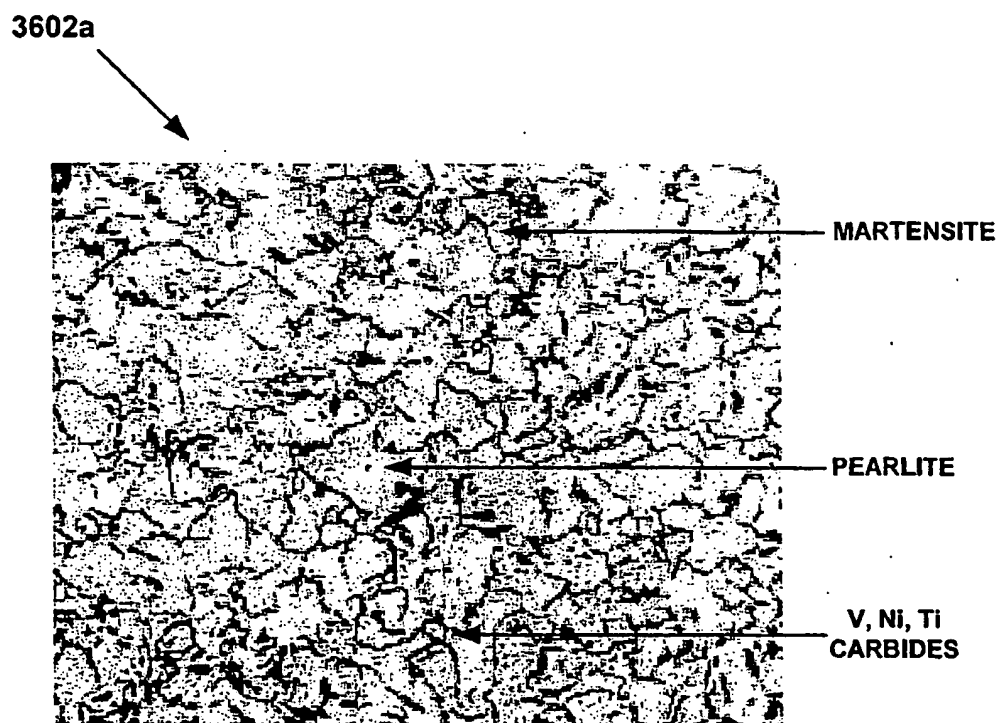


Fig. 36b

3602a

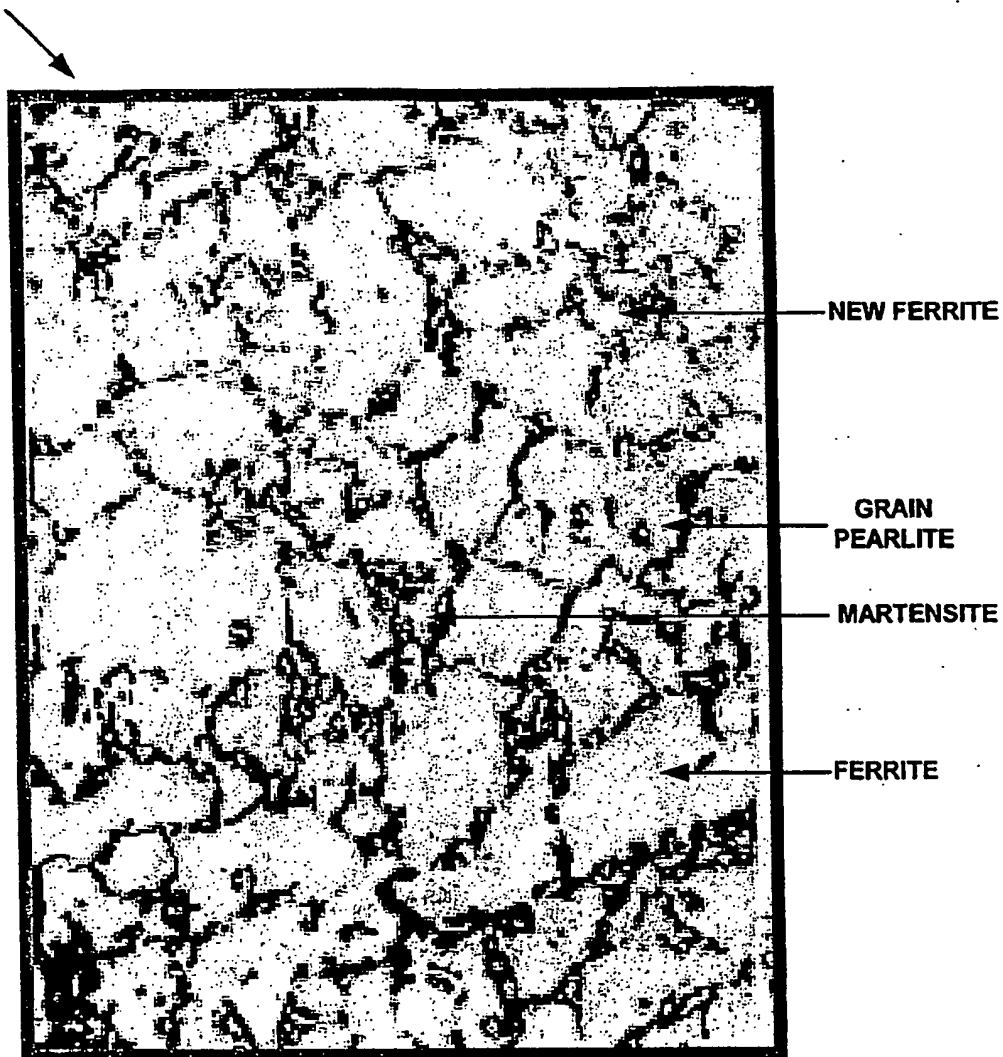


Fig. 36c



3700

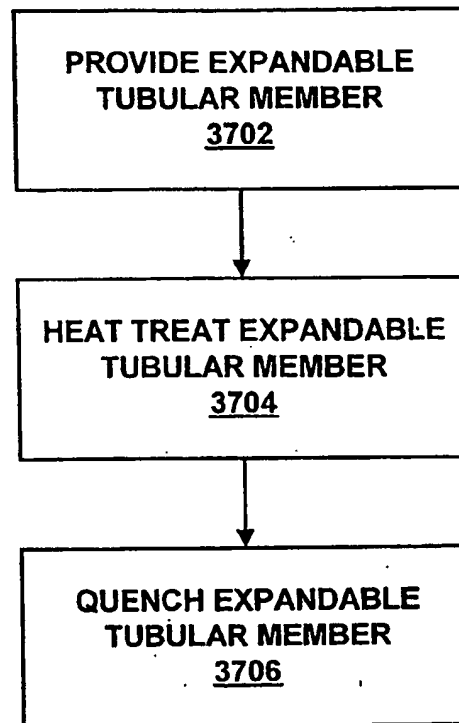
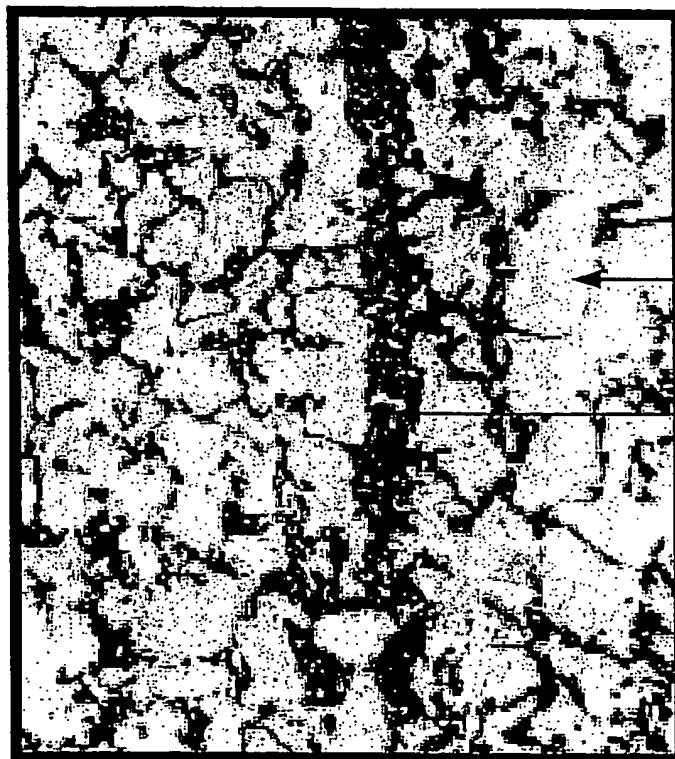


FIG. 37a

3702a



PEARLITE

PEARLITE  
STRIATION

Fig. 37b

3702a

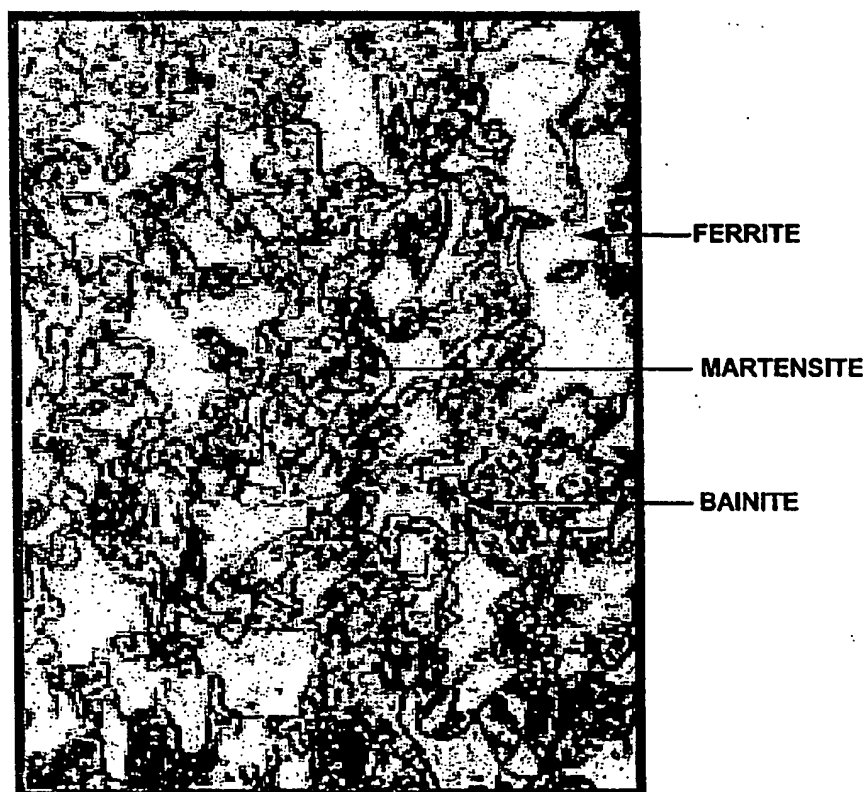


Fig. 37c

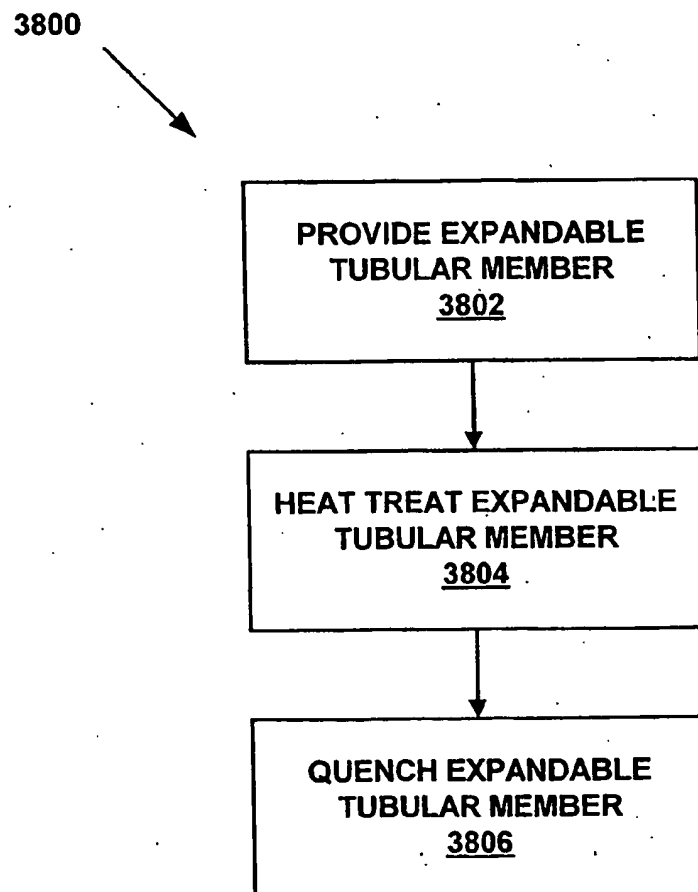


FIG. 38a

3802a



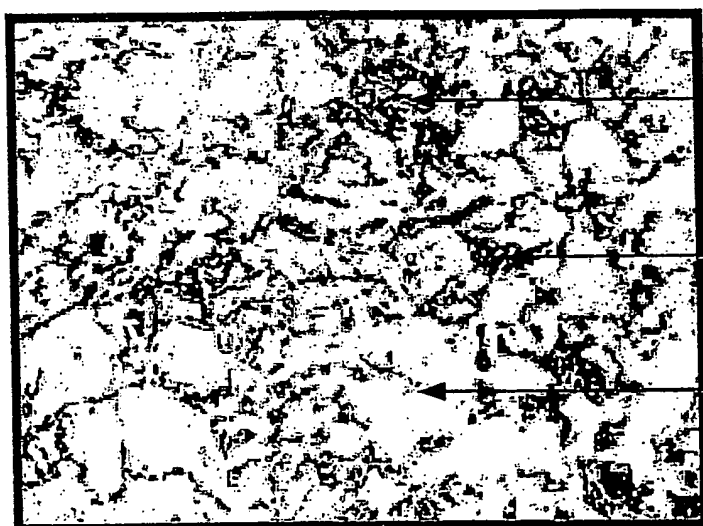
GRAIN PEARLITE

WIDMANSTATTEN  
MARTENSITE

V, Ni, and Ti CARBIDES

Fig. 38b

3802a



BAINITE

PEARLITE

NEW FERRITE

Fig. 38c

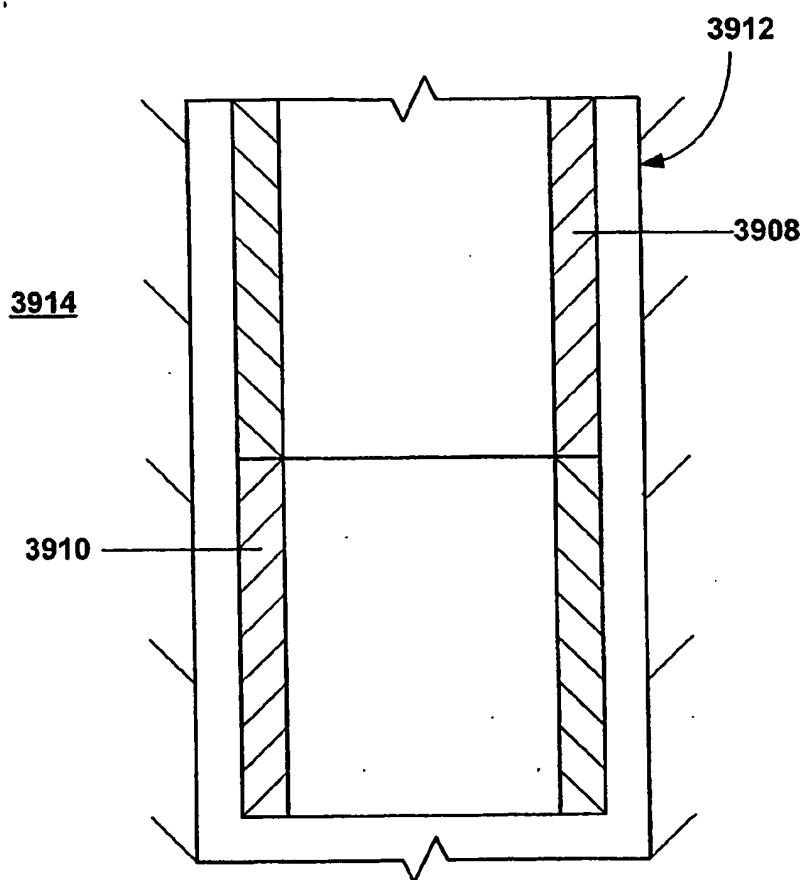


FIG. 39a

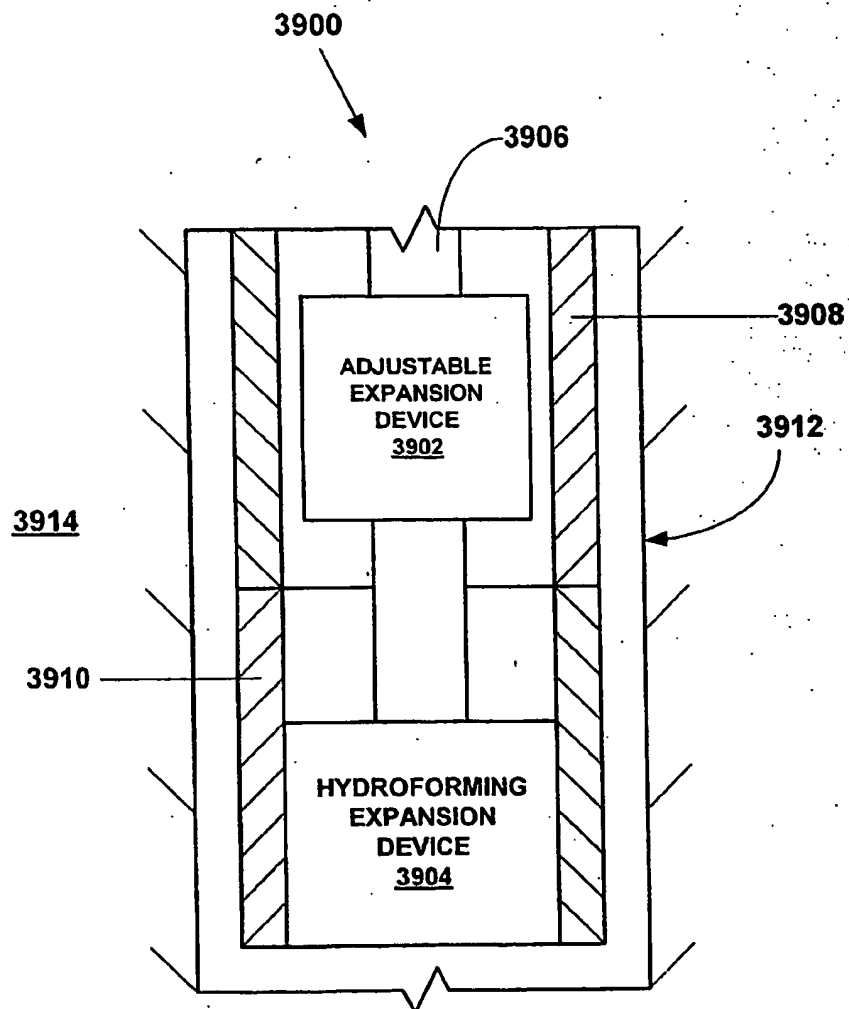


FIG. 39b



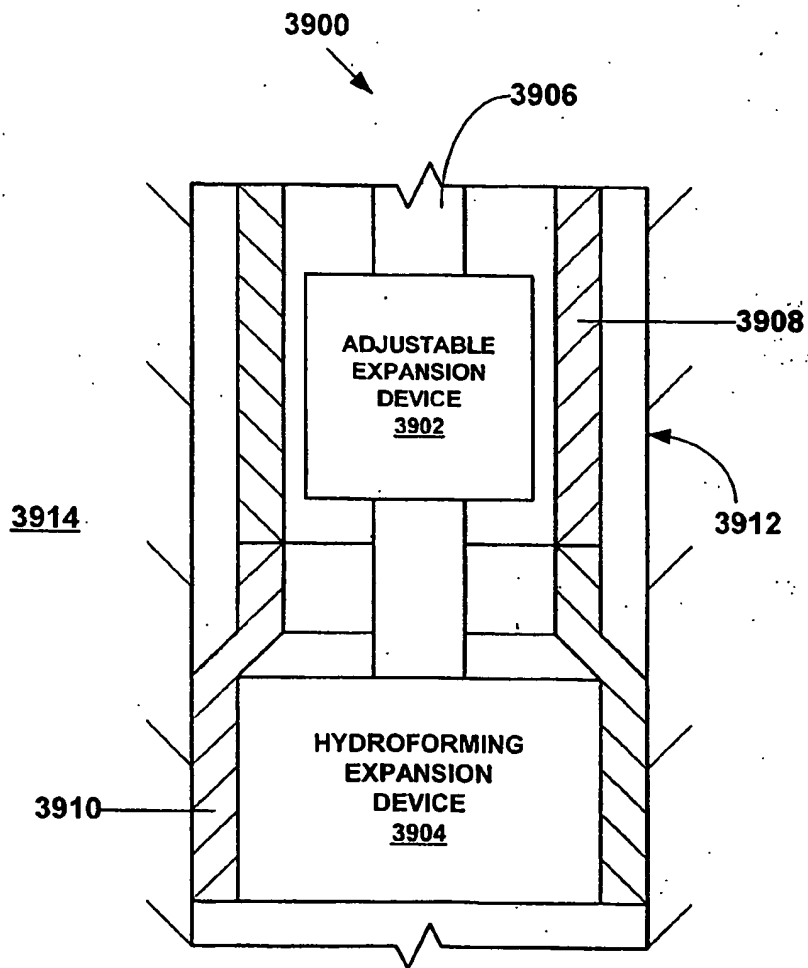


FIG. 39c

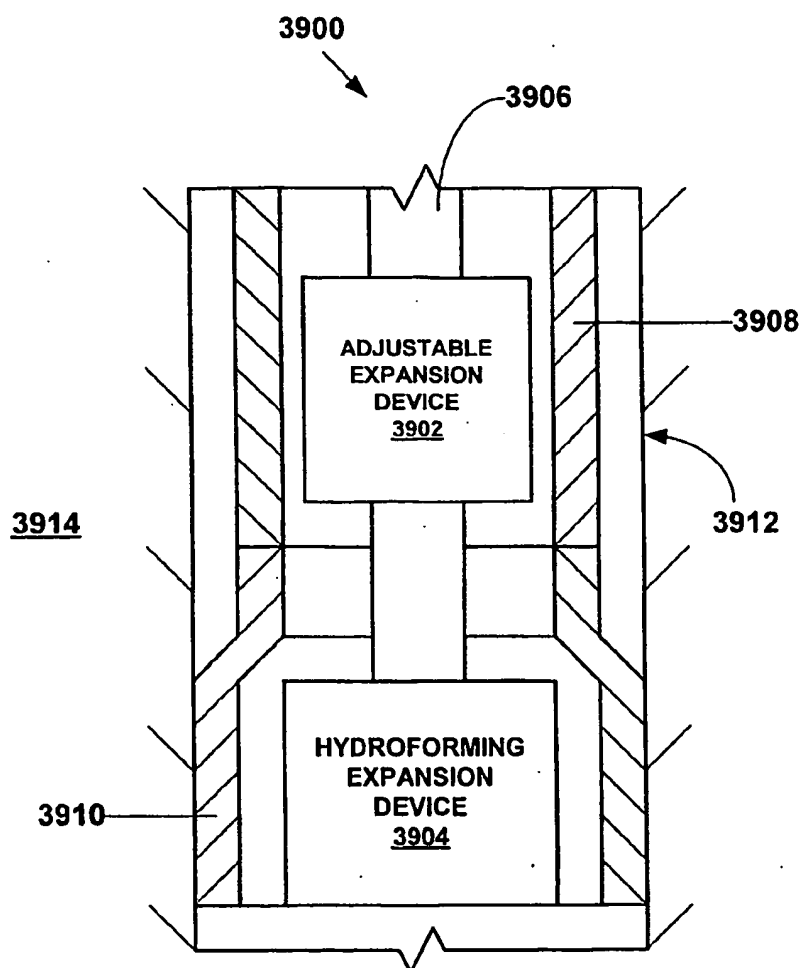


FIG. 39d

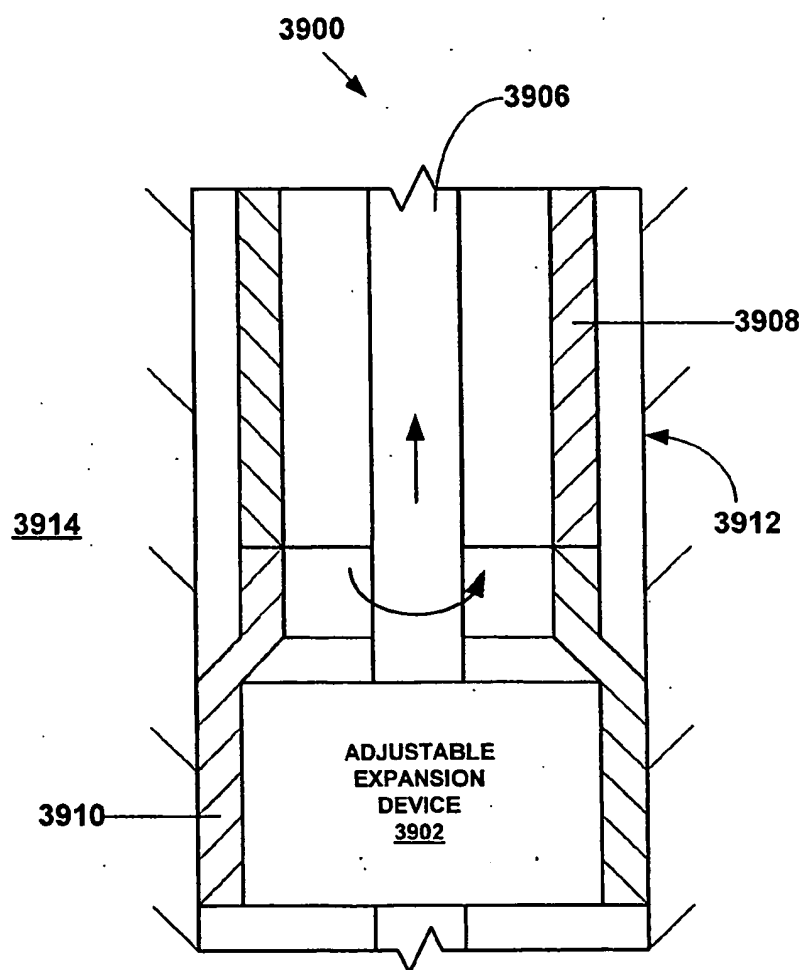


FIG. 39e

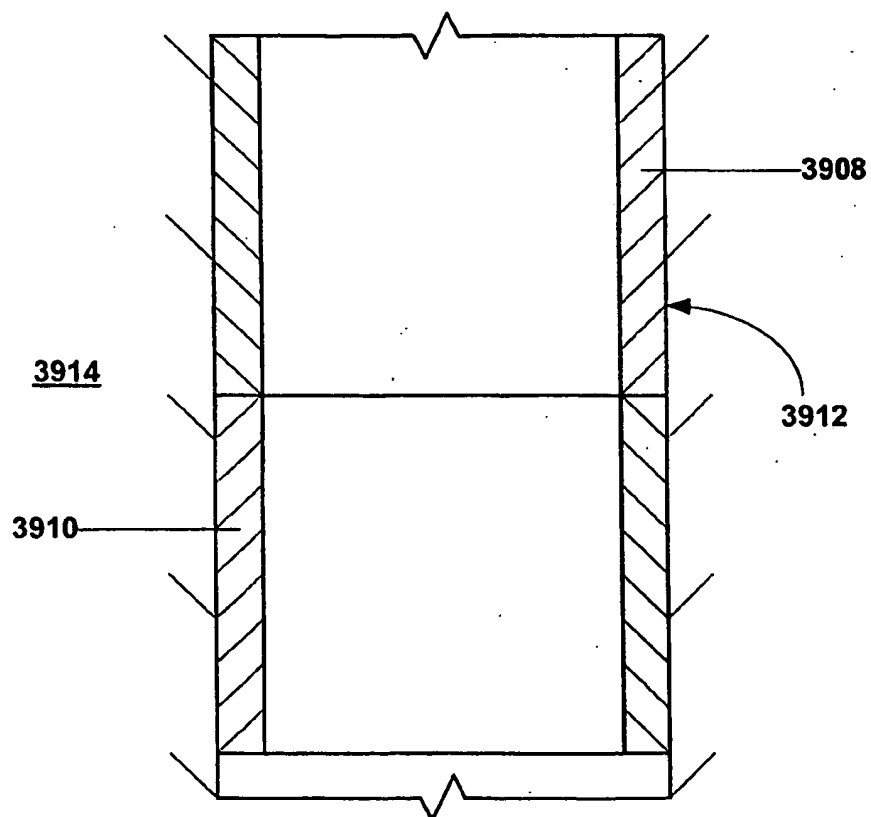


FIG. 39f

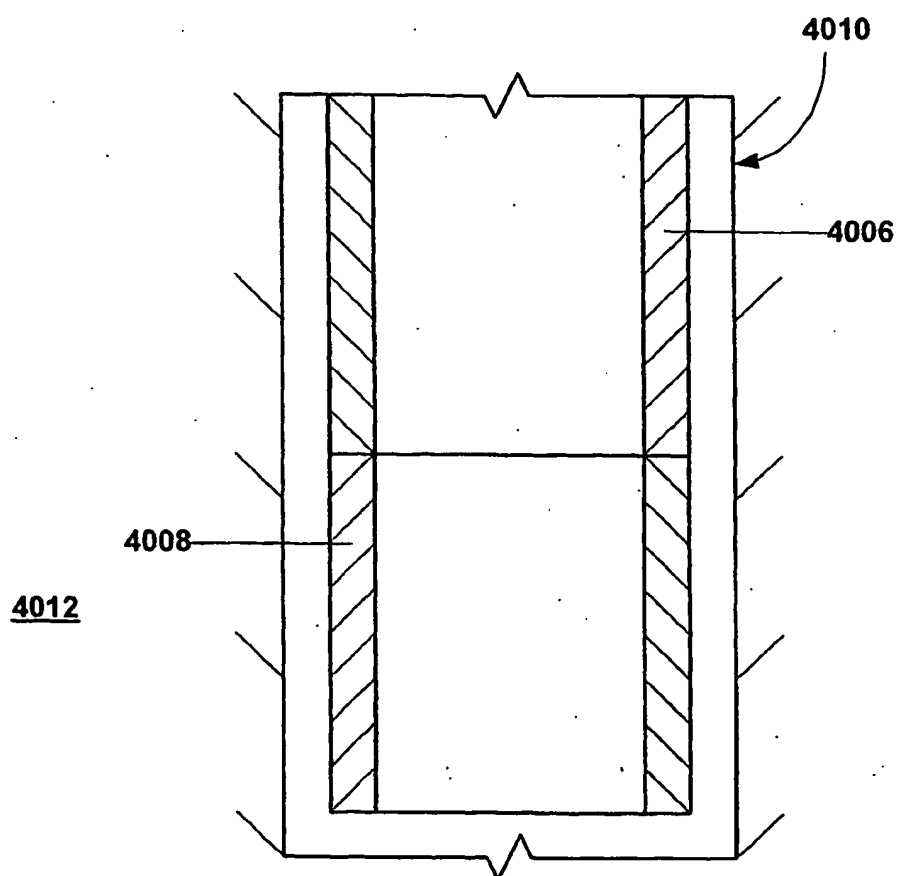


FIG. 40a

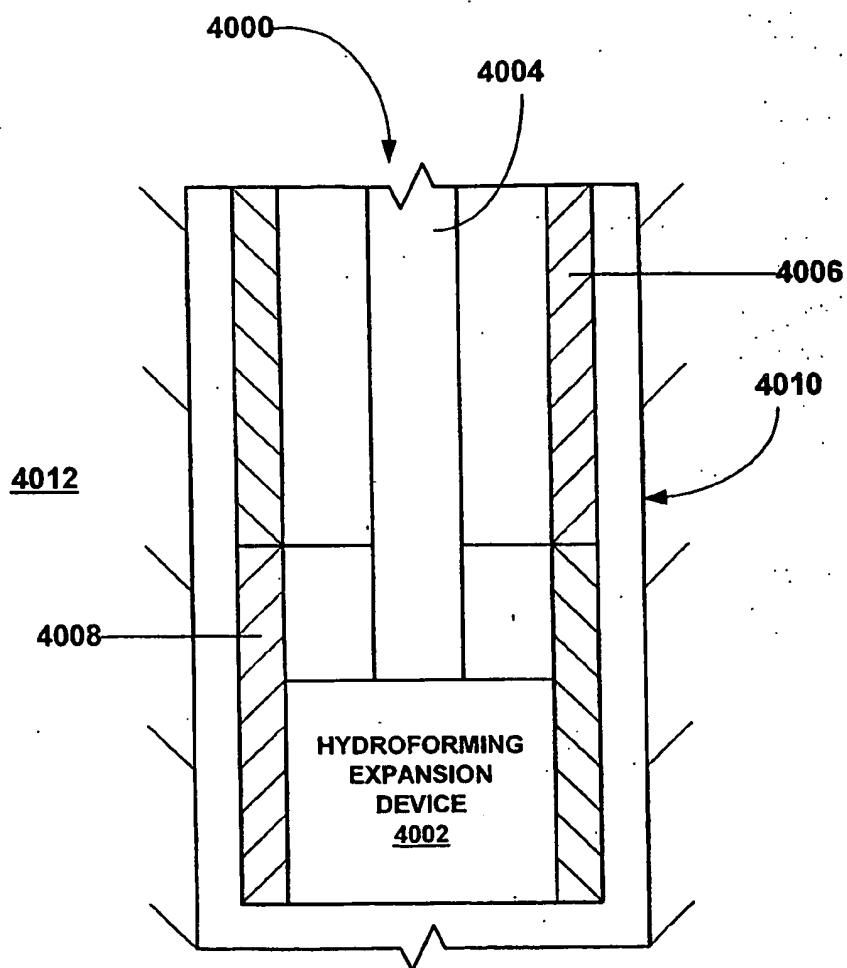


FIG. 40b

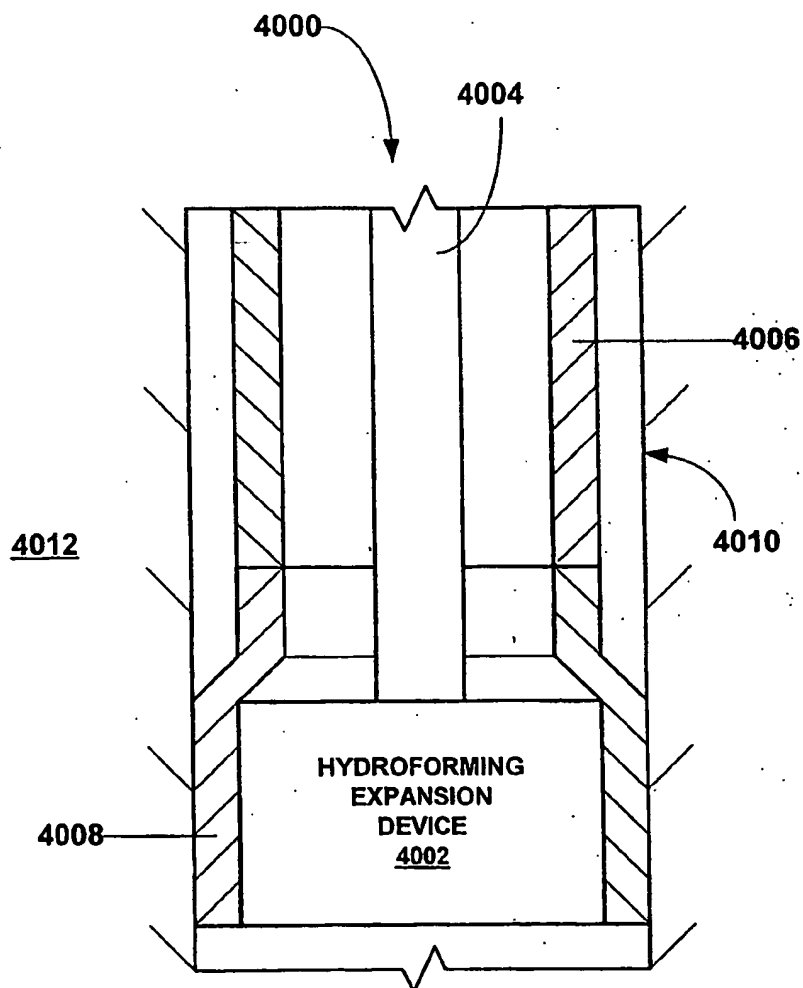


FIG. 40c

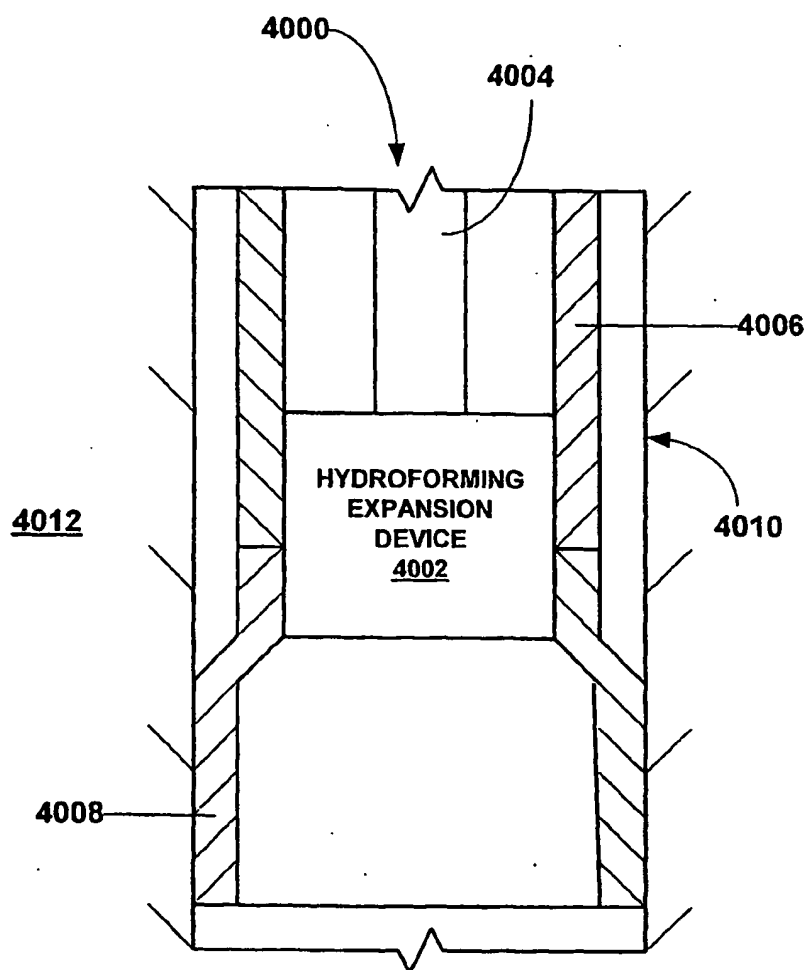


FIG. 40d



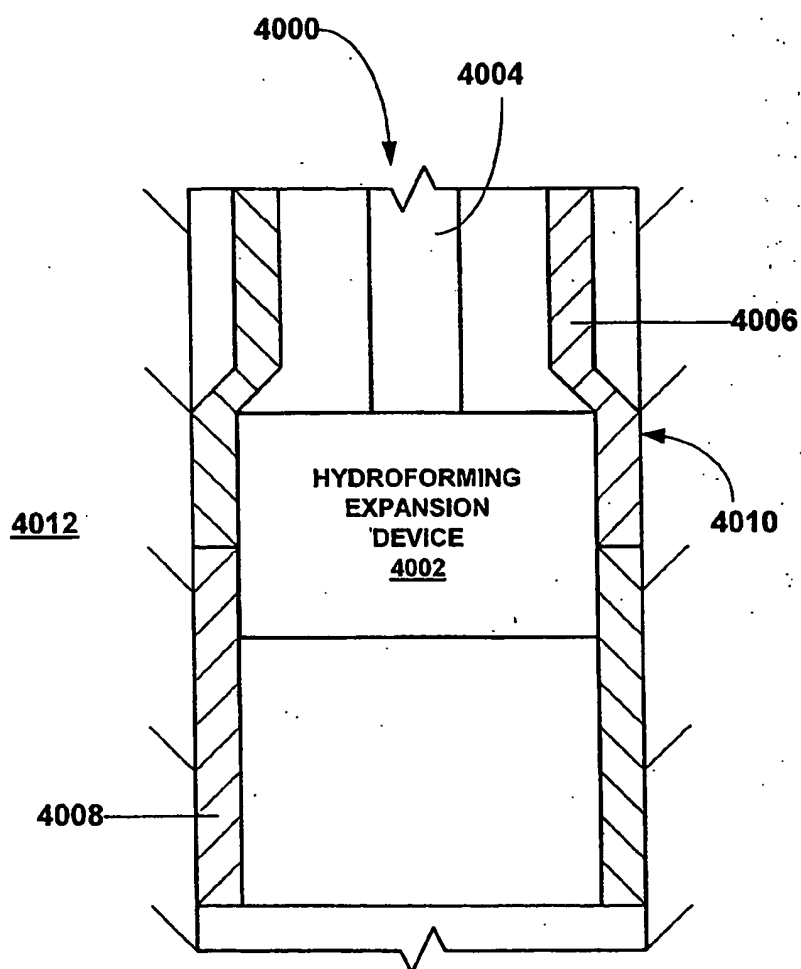


FIG. 40e

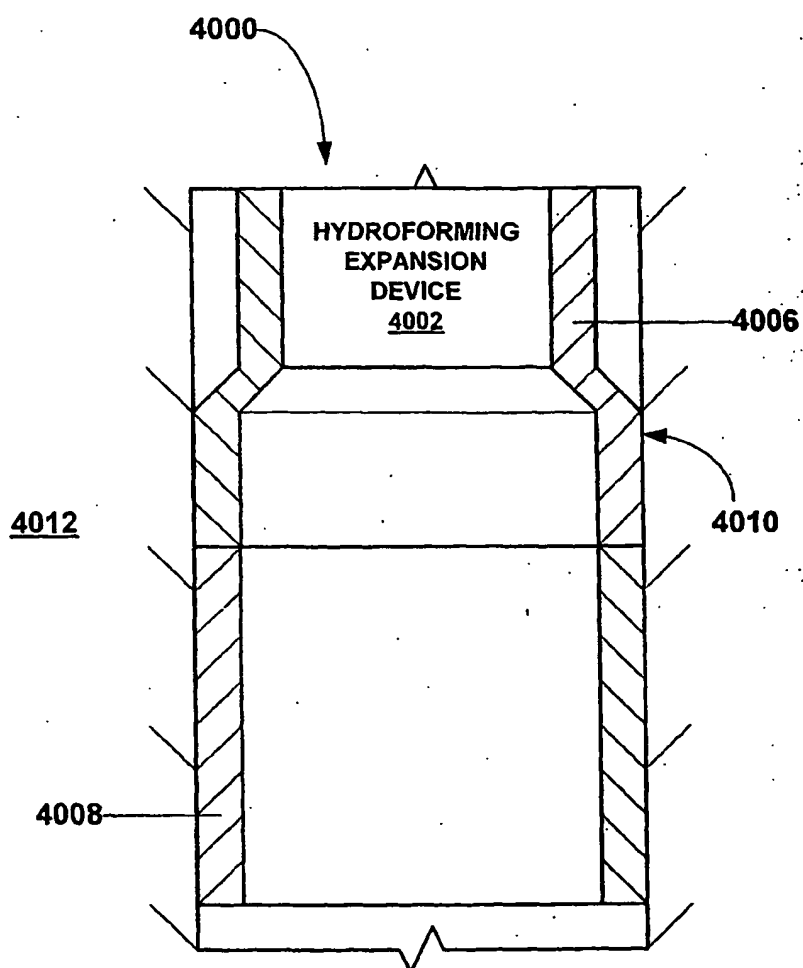


FIG. 40f

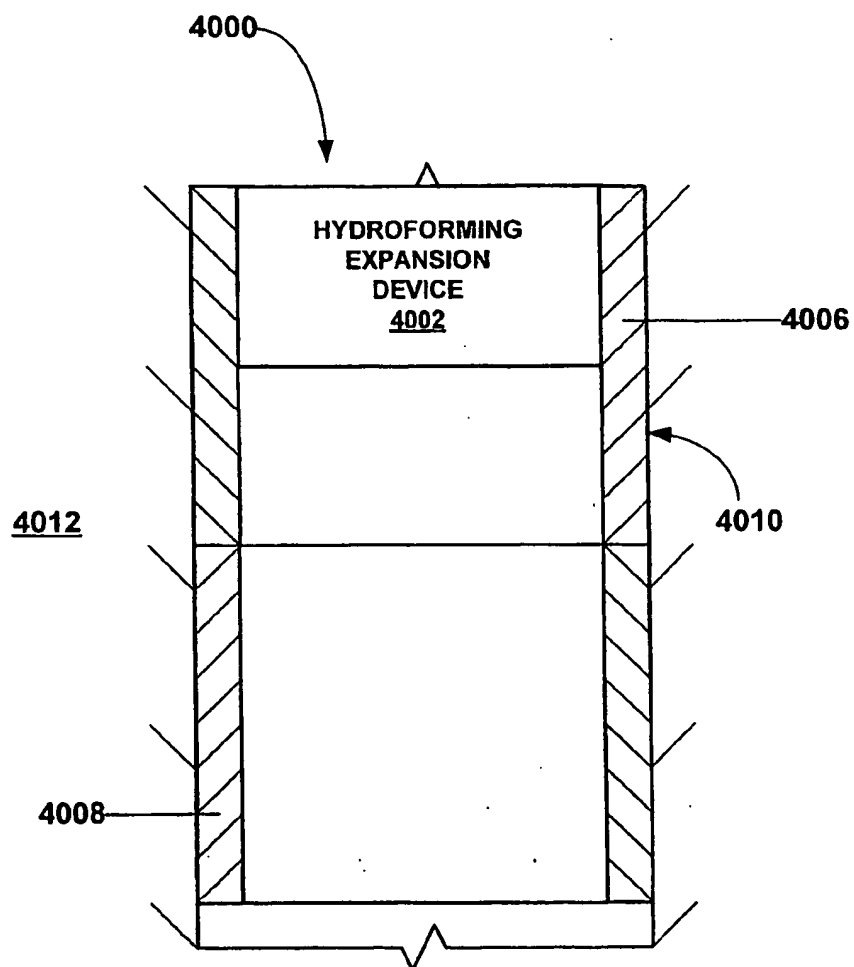


FIG. 40g

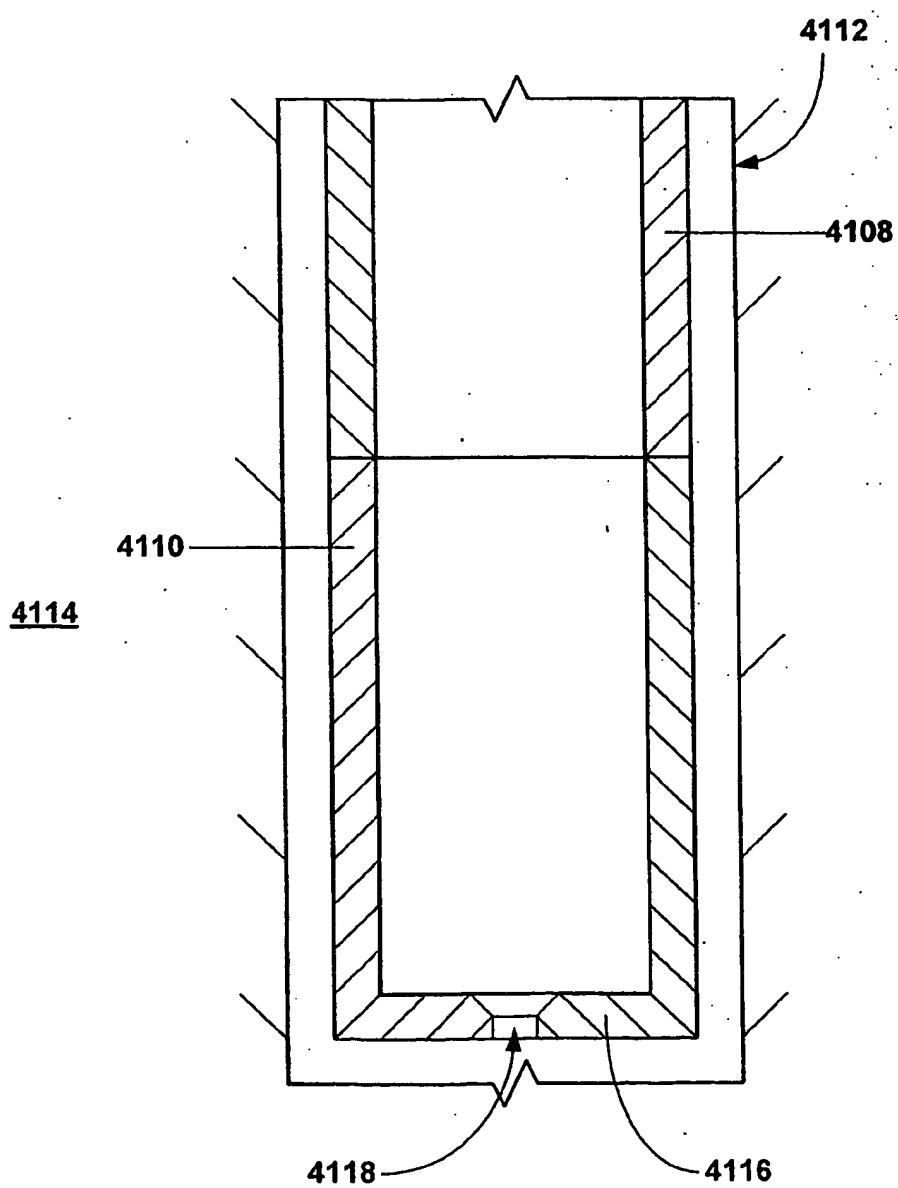


FIG. 41a

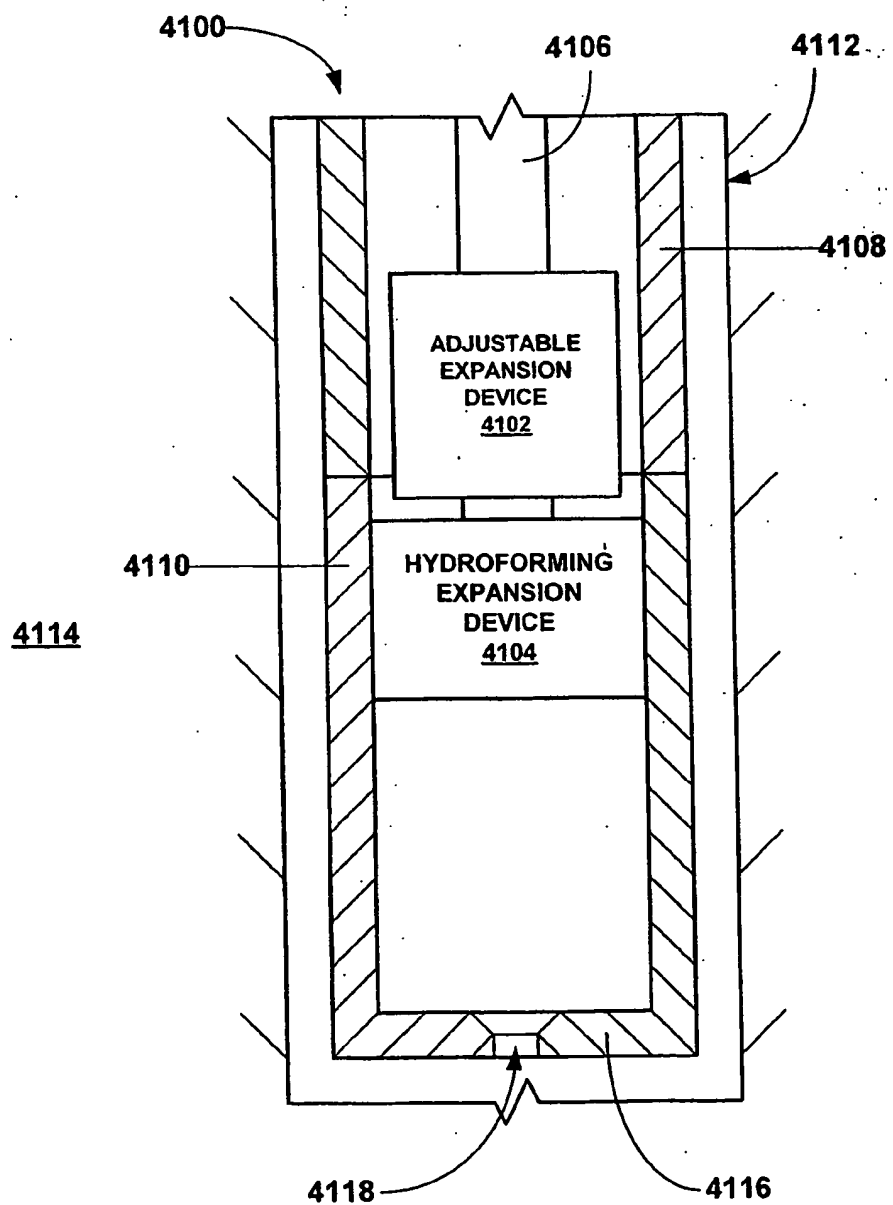


FIG. 41b

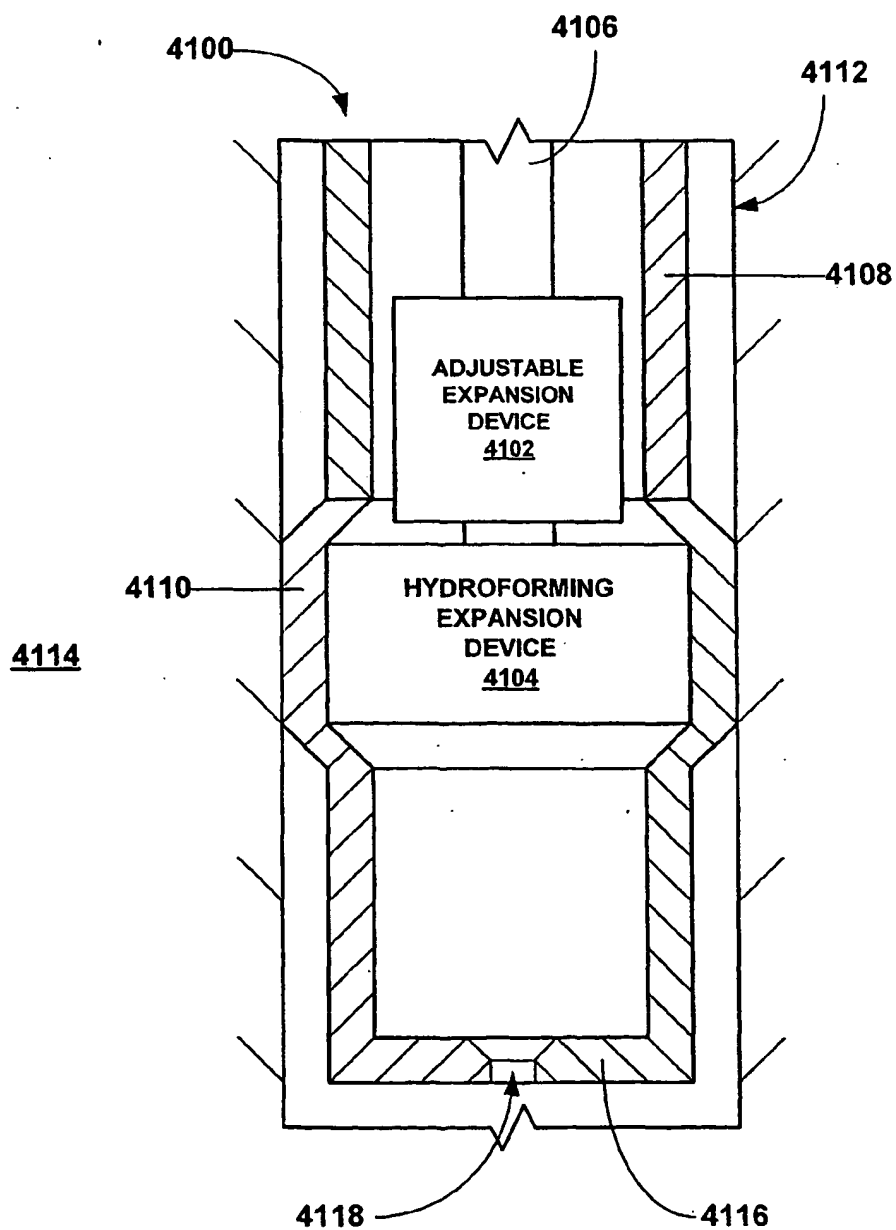


FIG. 41c

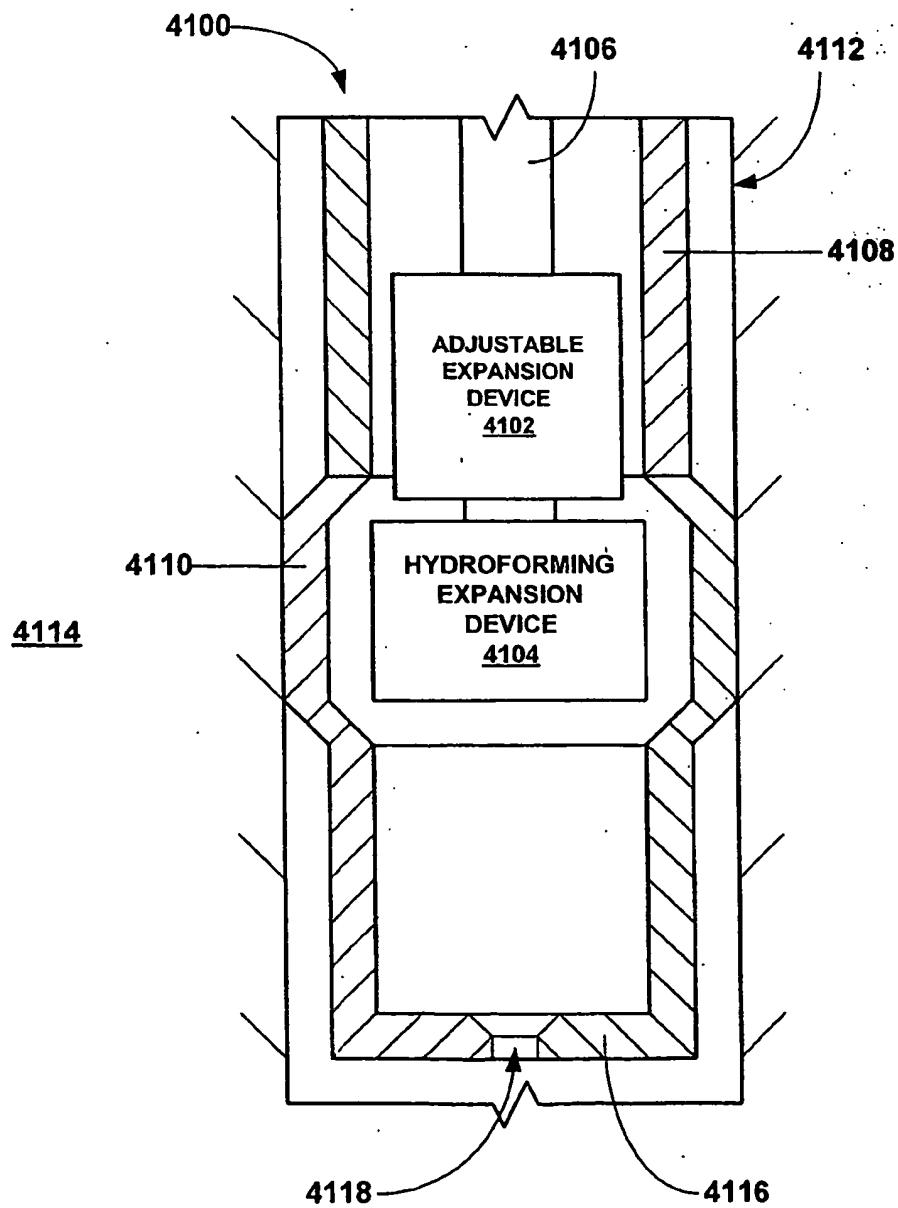


FIG. 41d

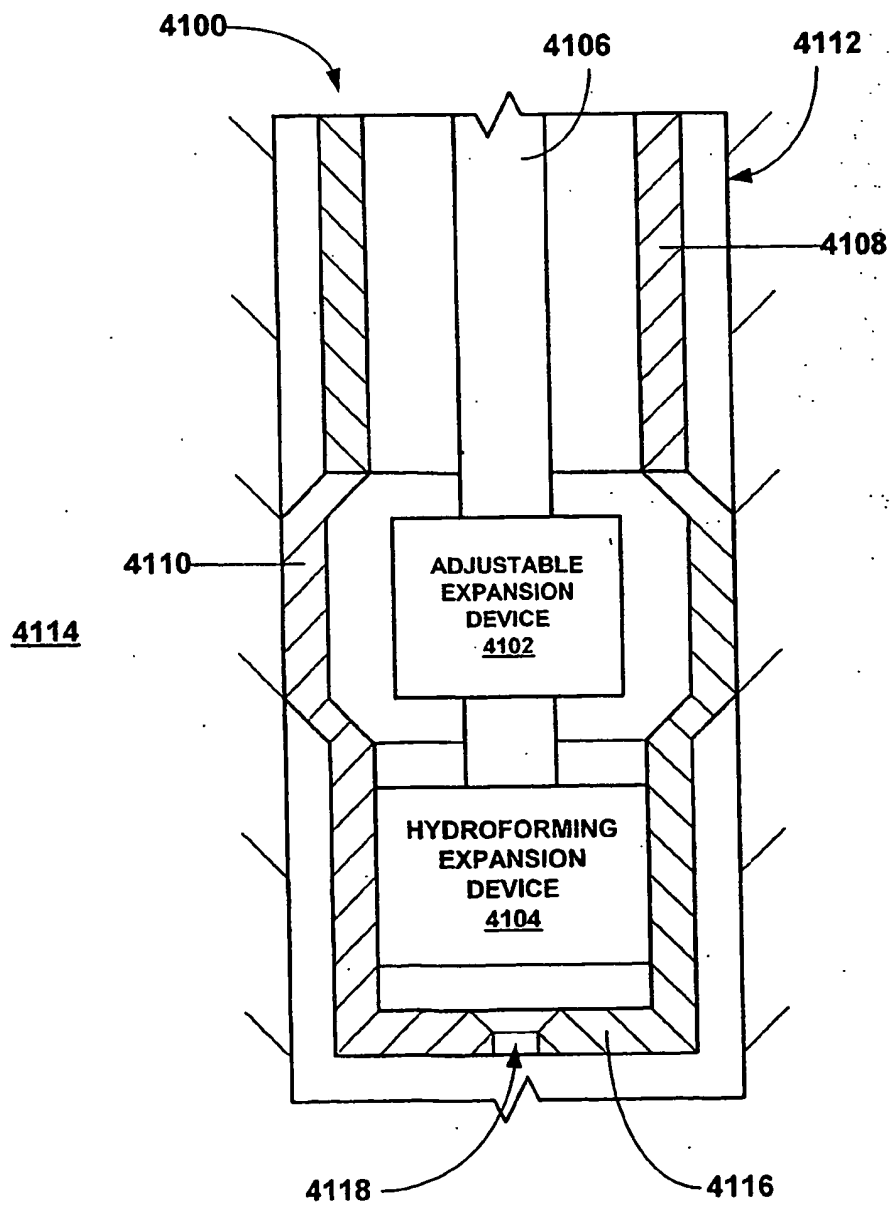


FIG. 41e



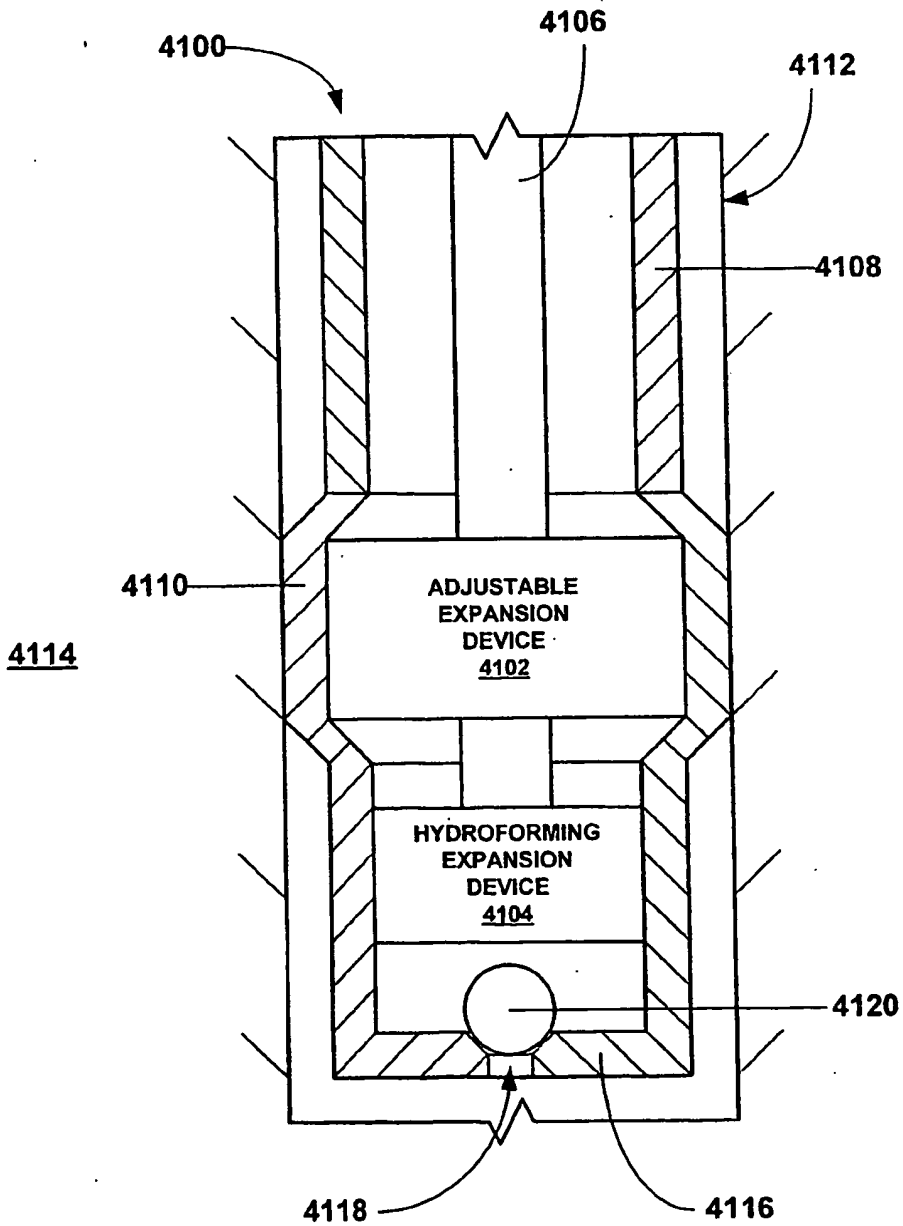


FIG. 41f

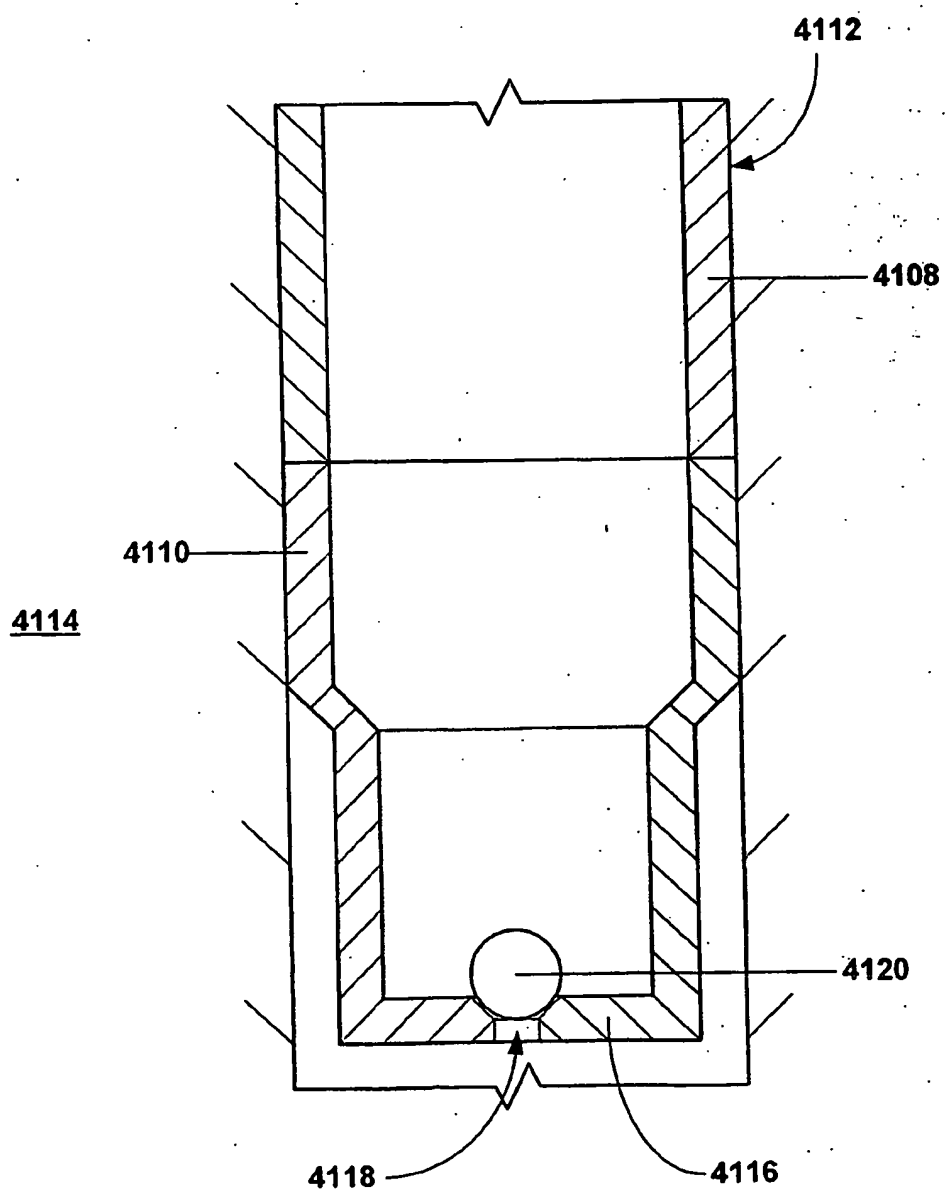


FIG. 41g

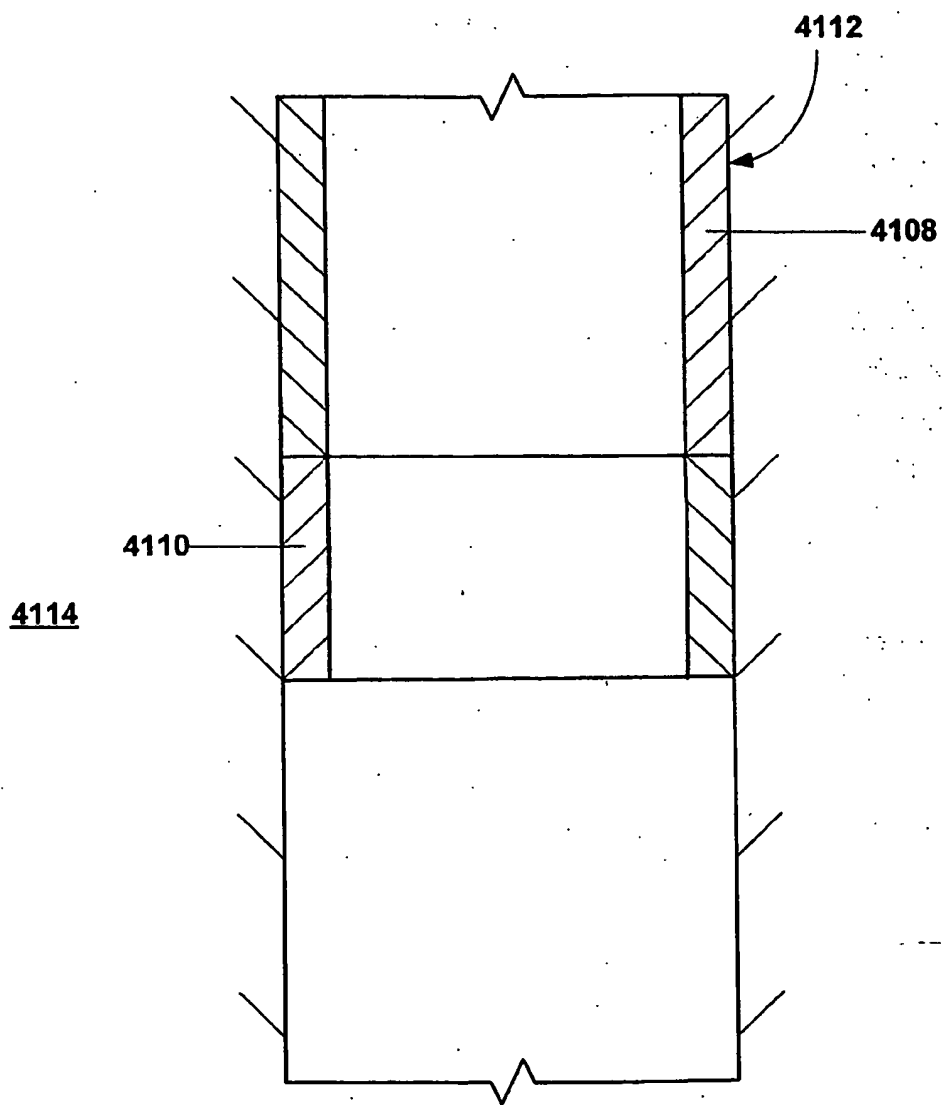


FIG. 41h

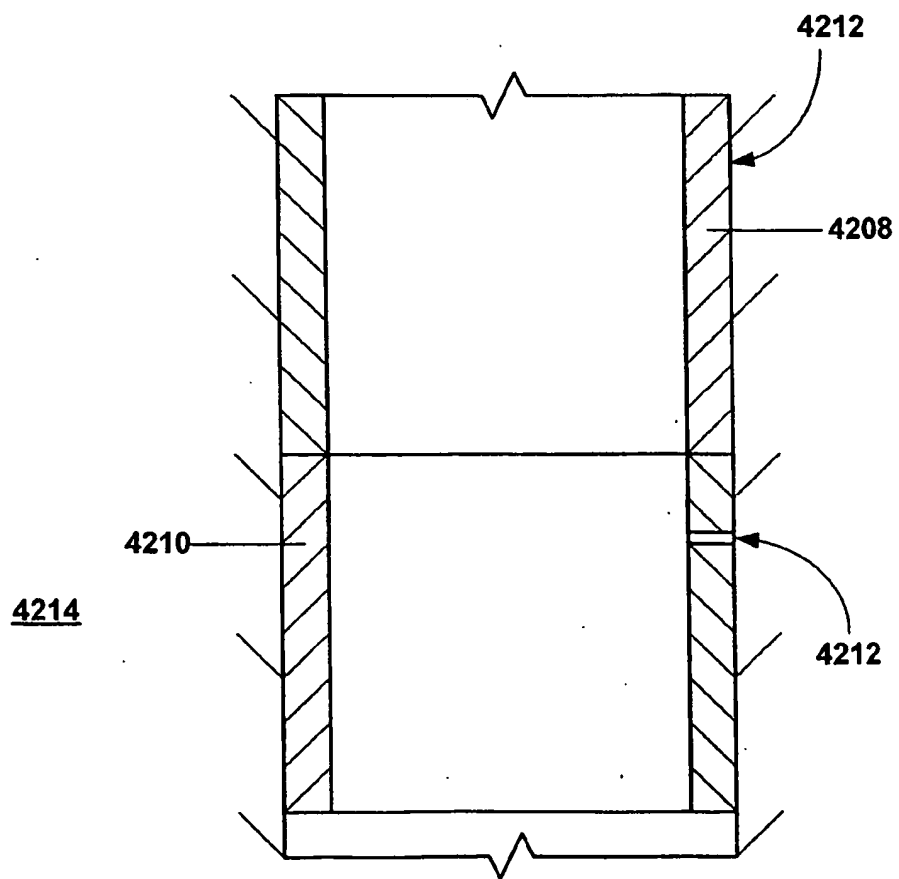


FIG. 42a

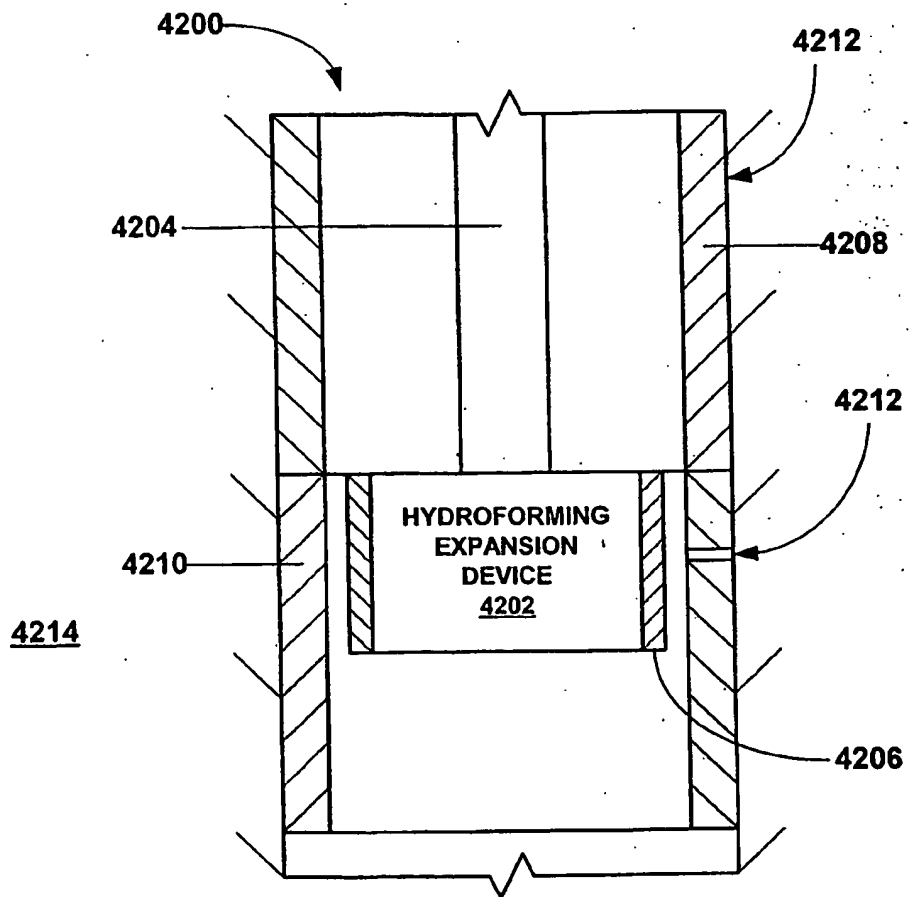


FIG. 42b

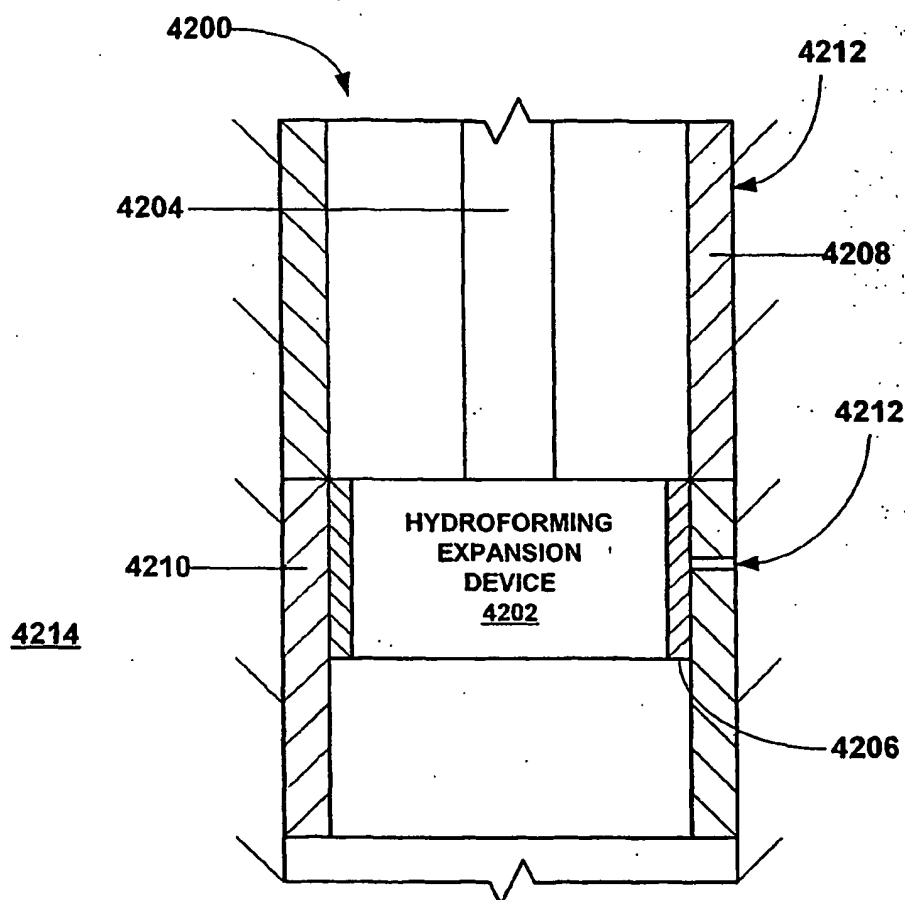


FIG. 42c

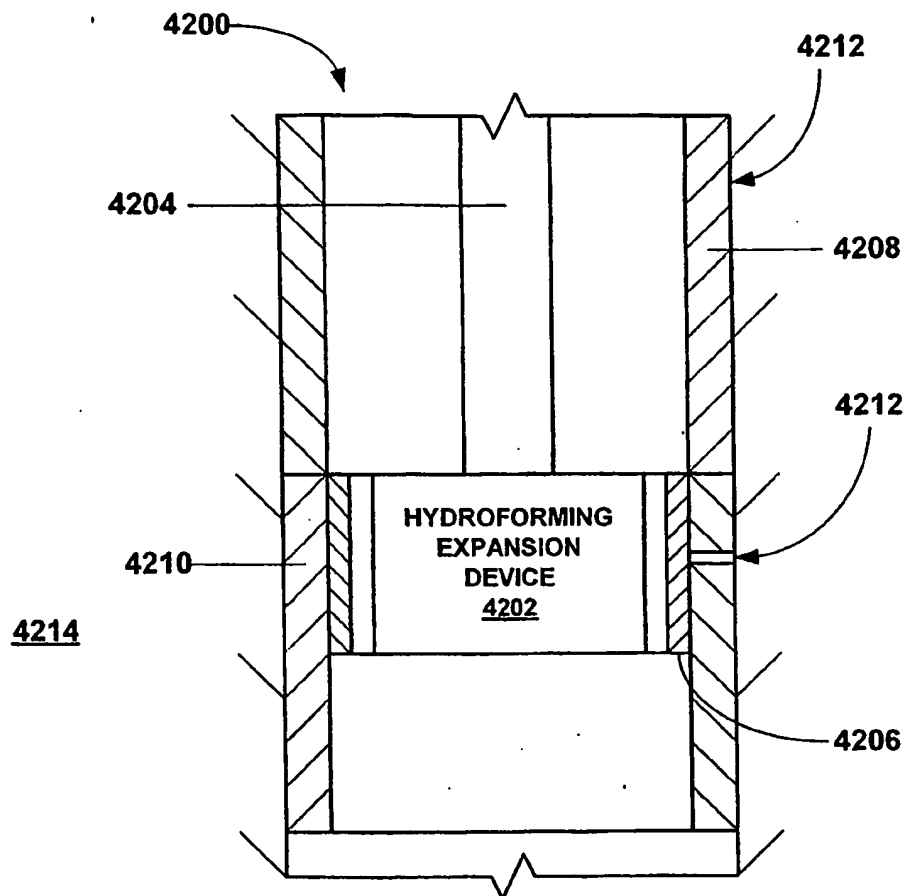


FIG. 42d

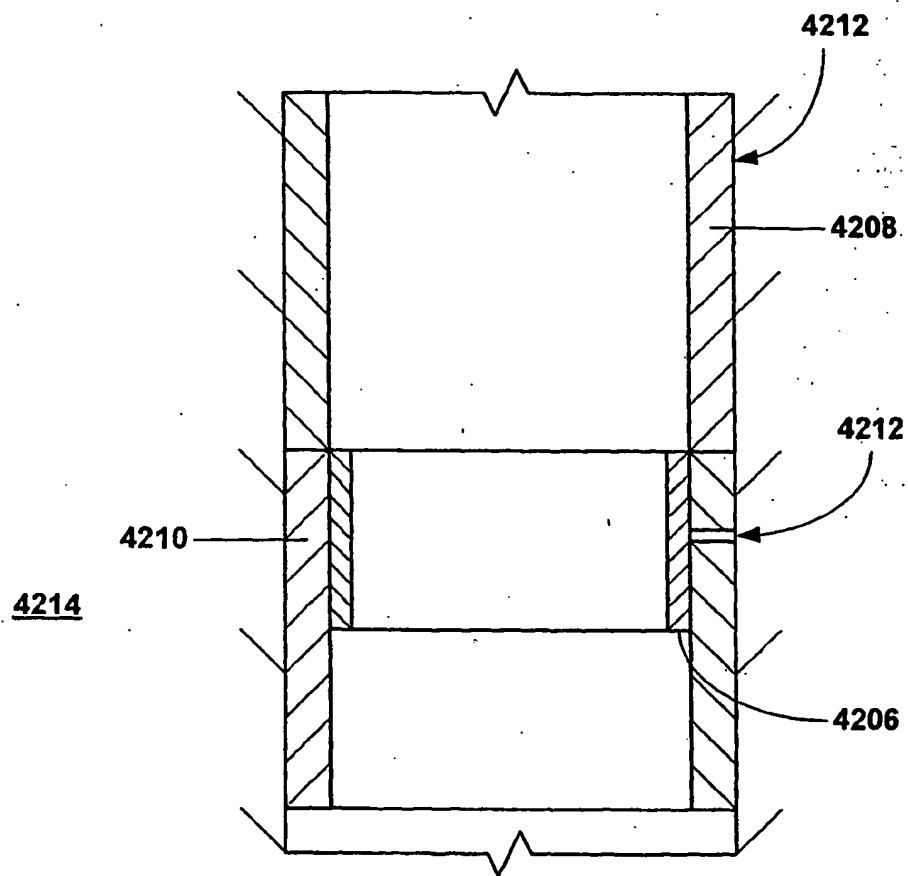


FIG. 42e



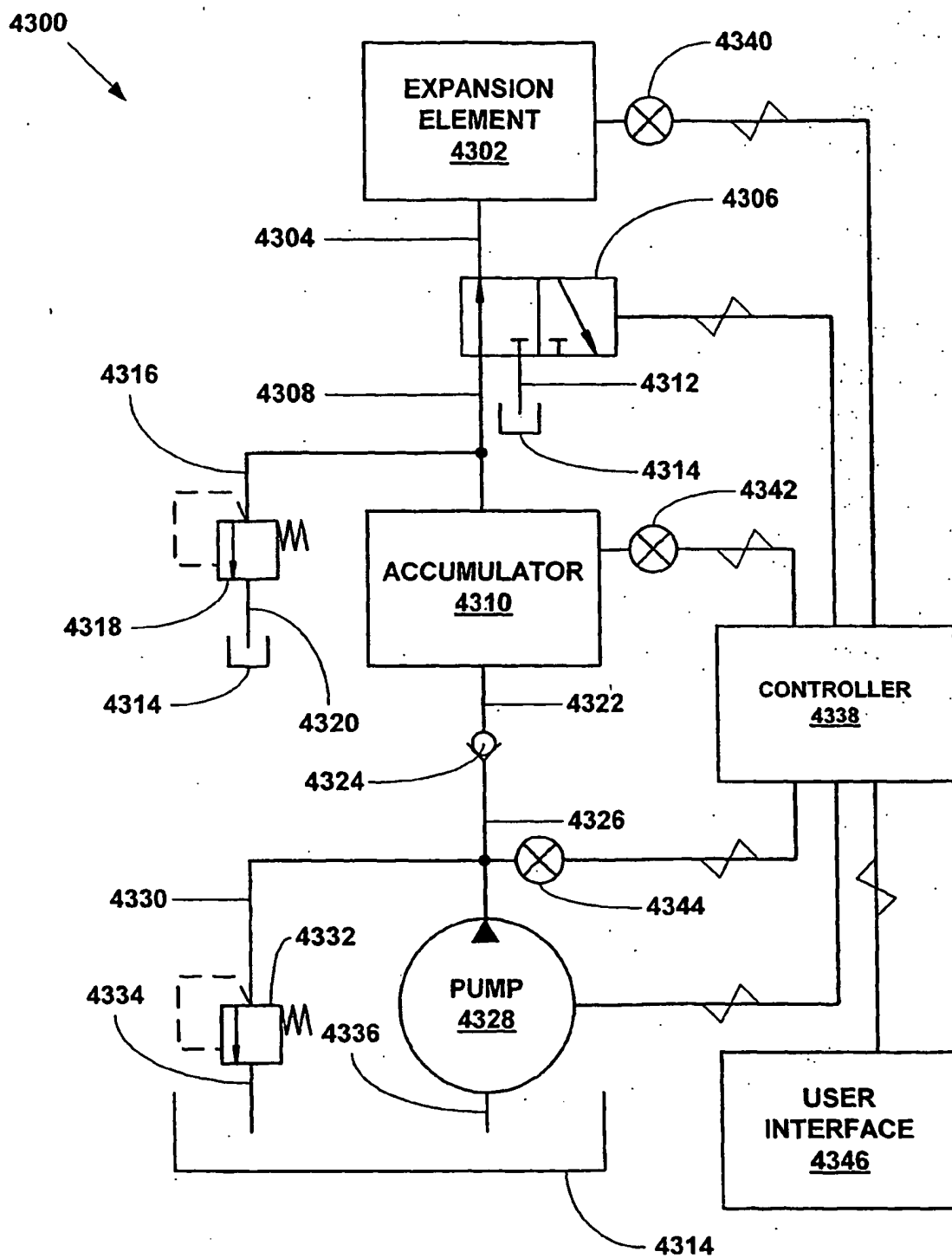


FIG. 43

4400

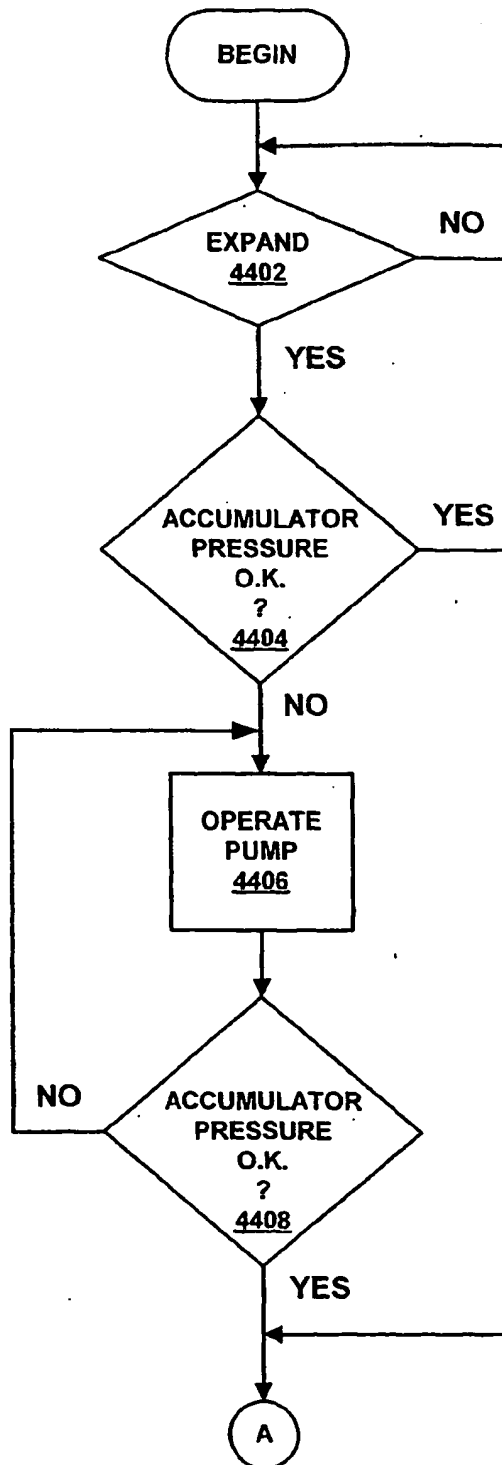


FIG. 44a

4400

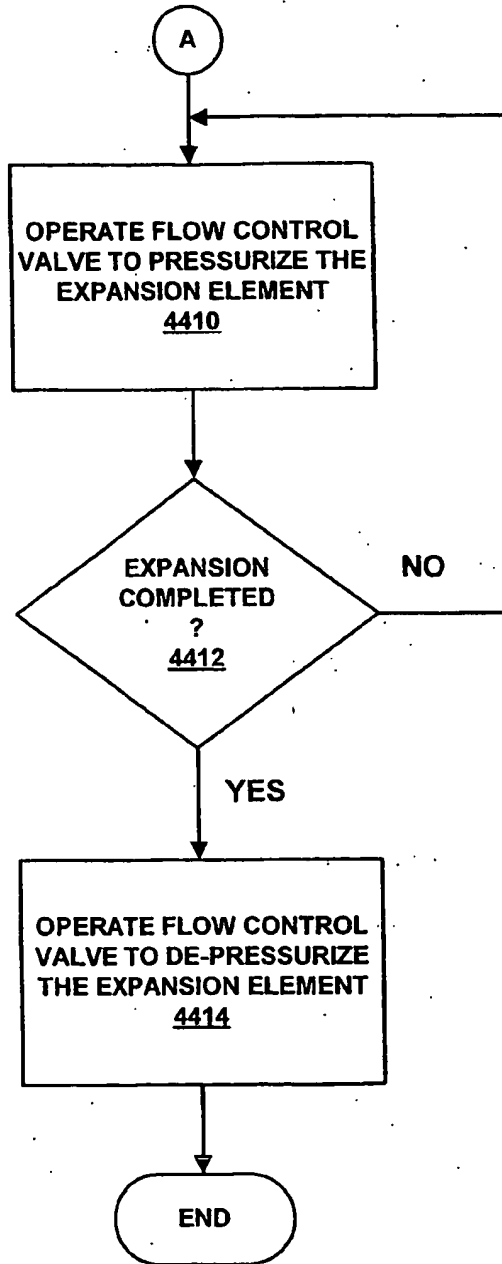
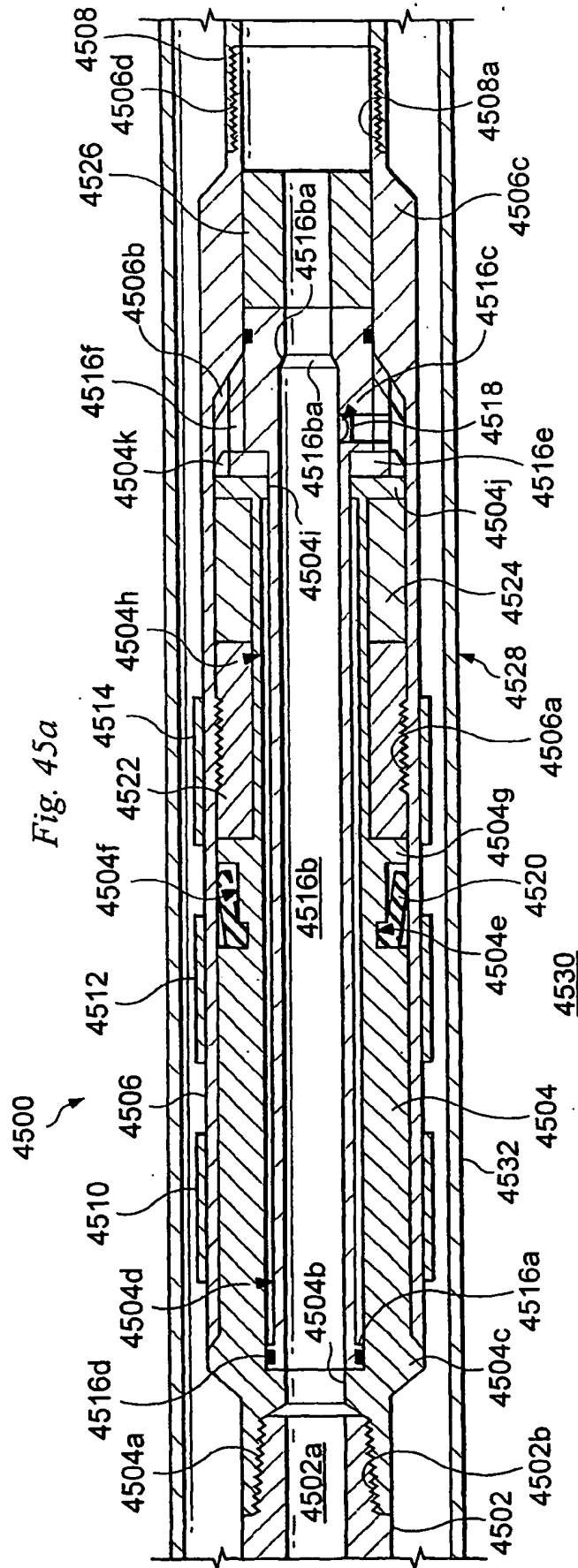
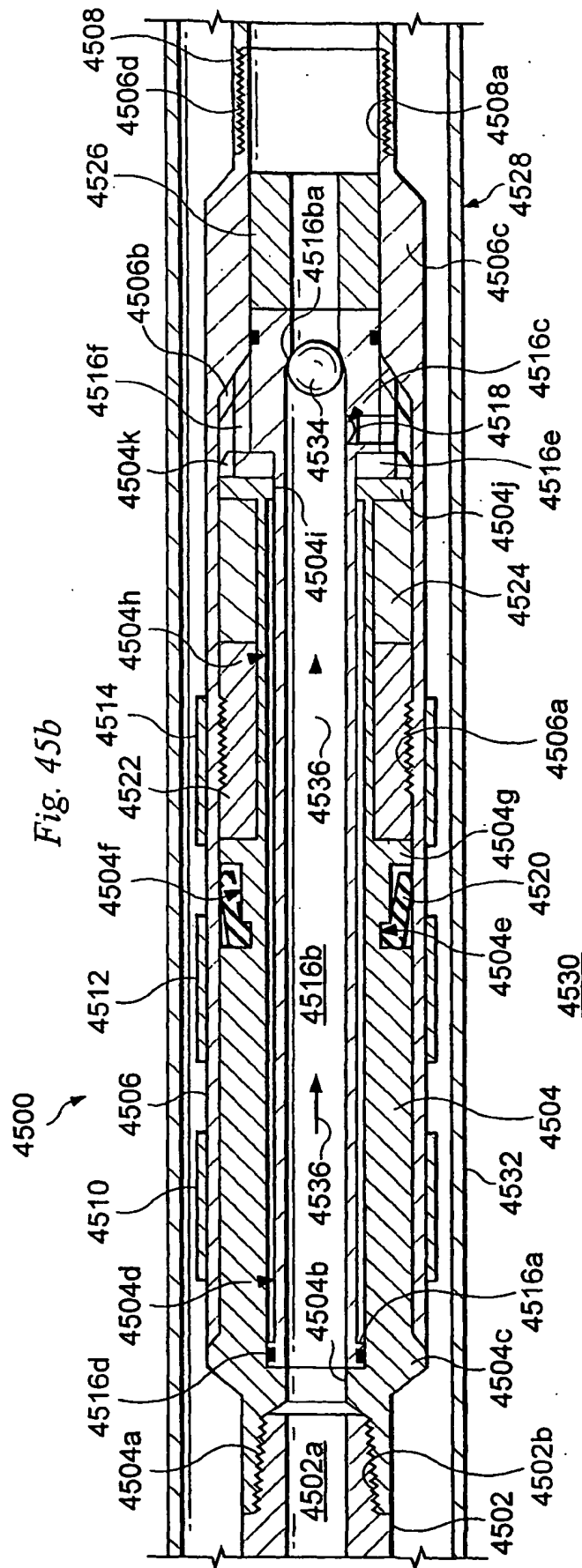
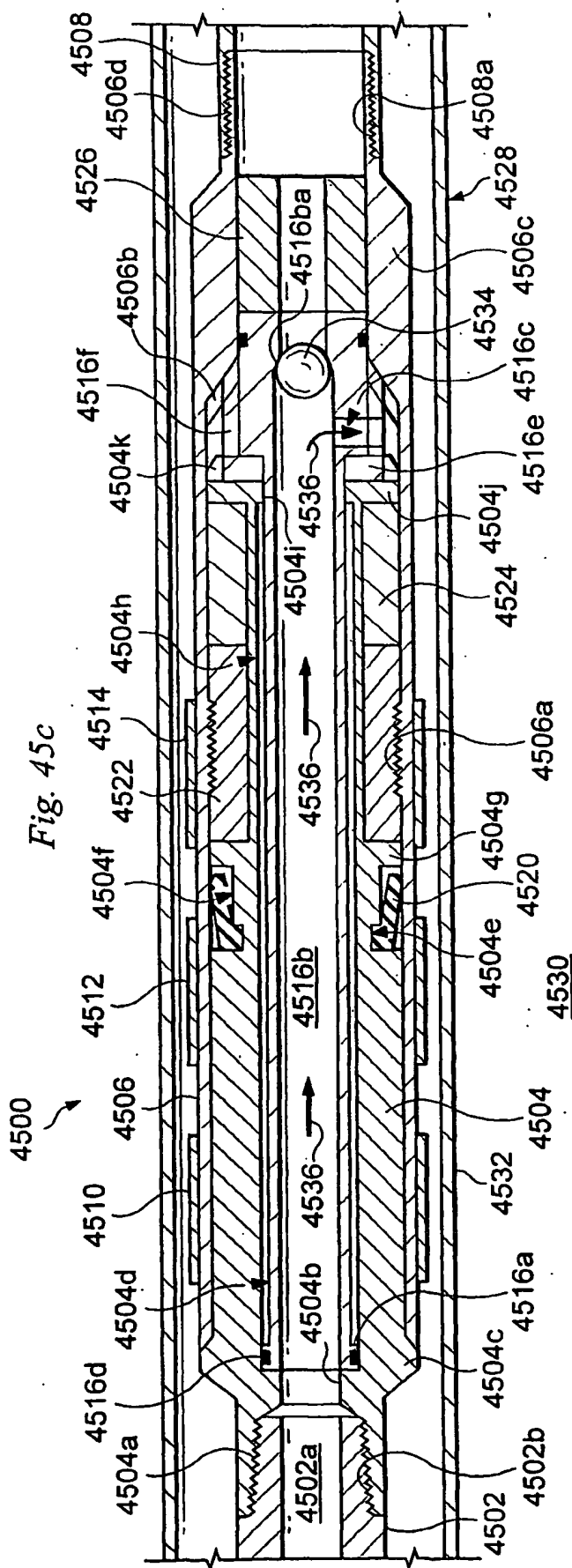
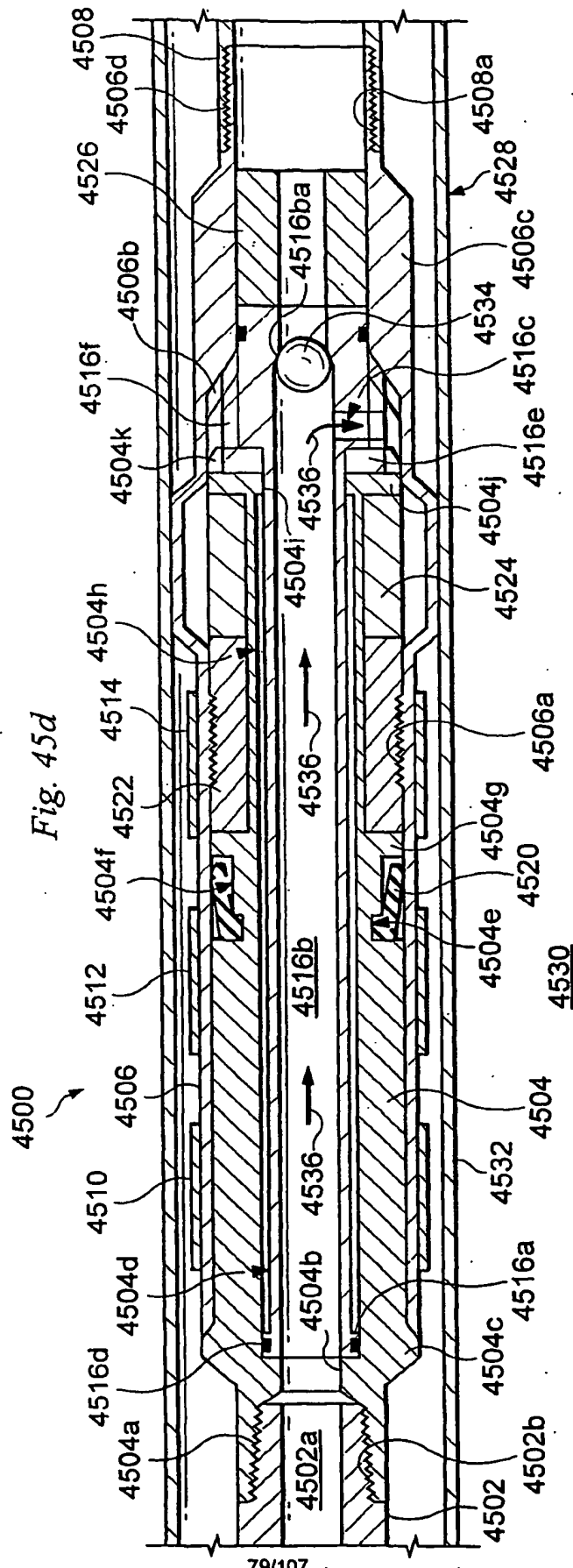


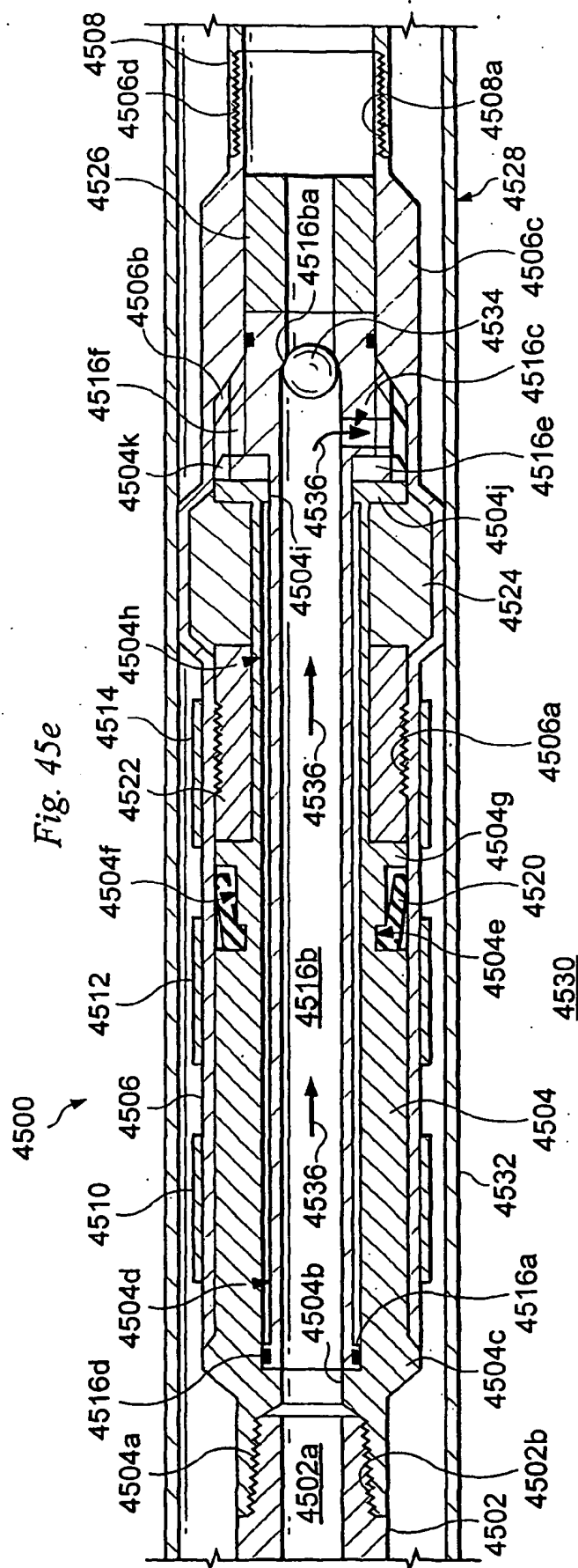
FIG. 44b



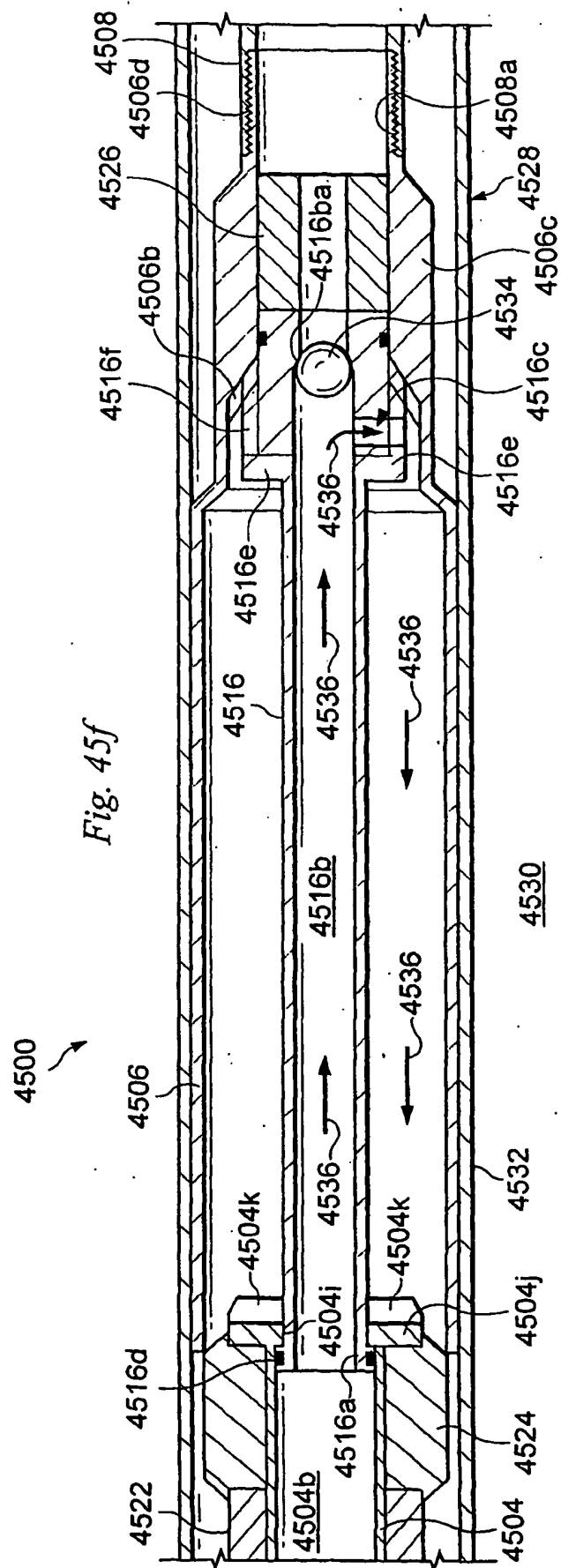


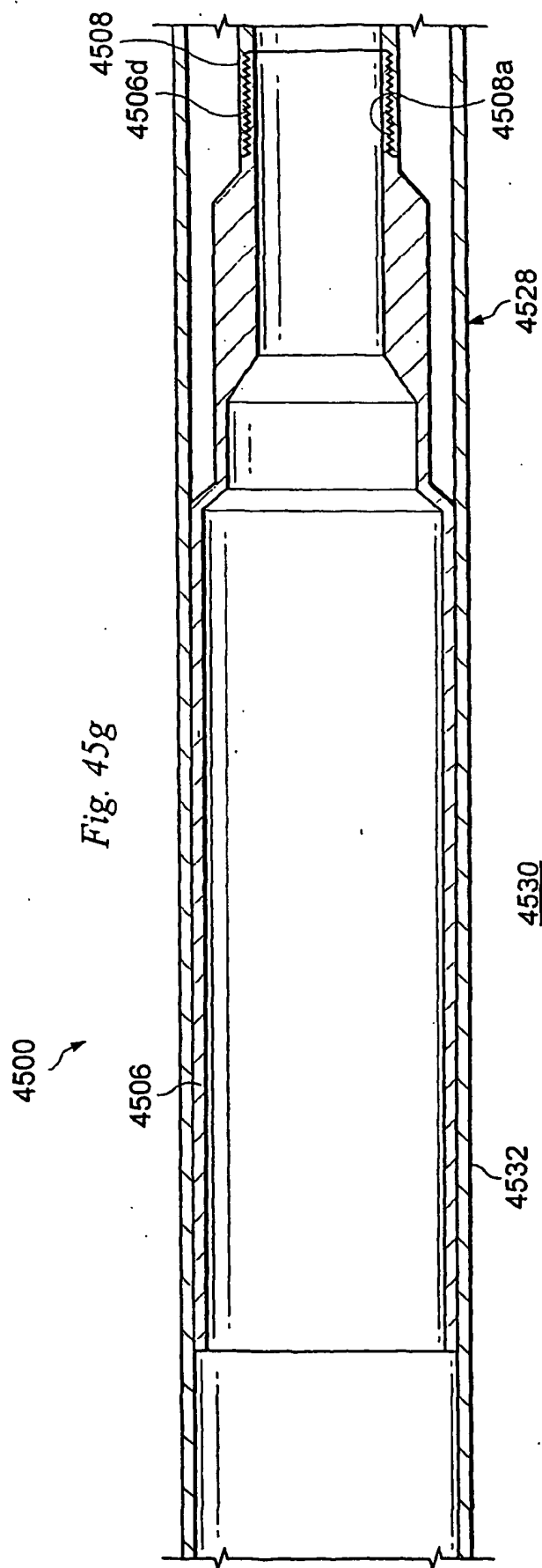












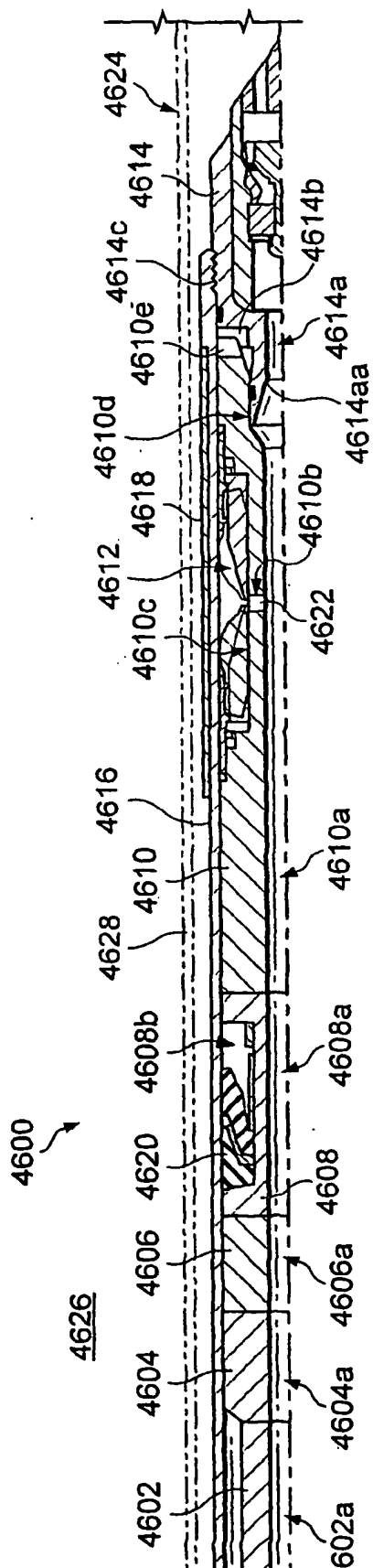


Fig. 46a

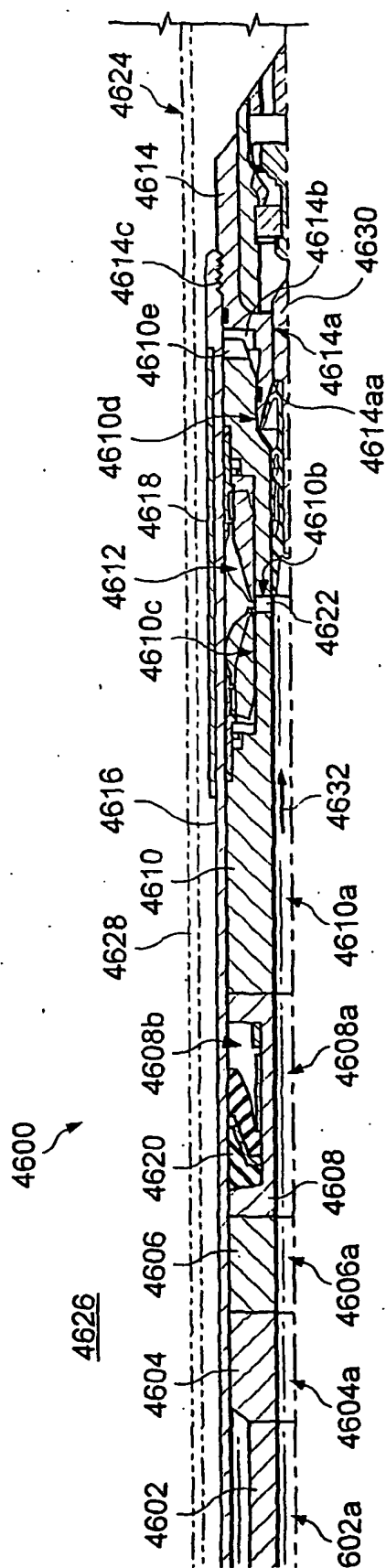


Fig. 46b

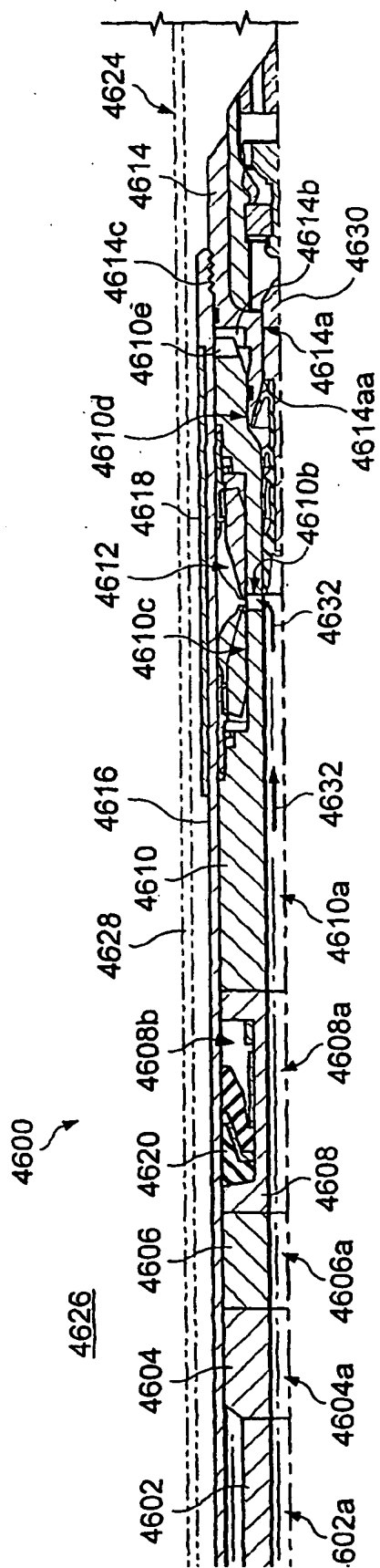


Fig. 46c

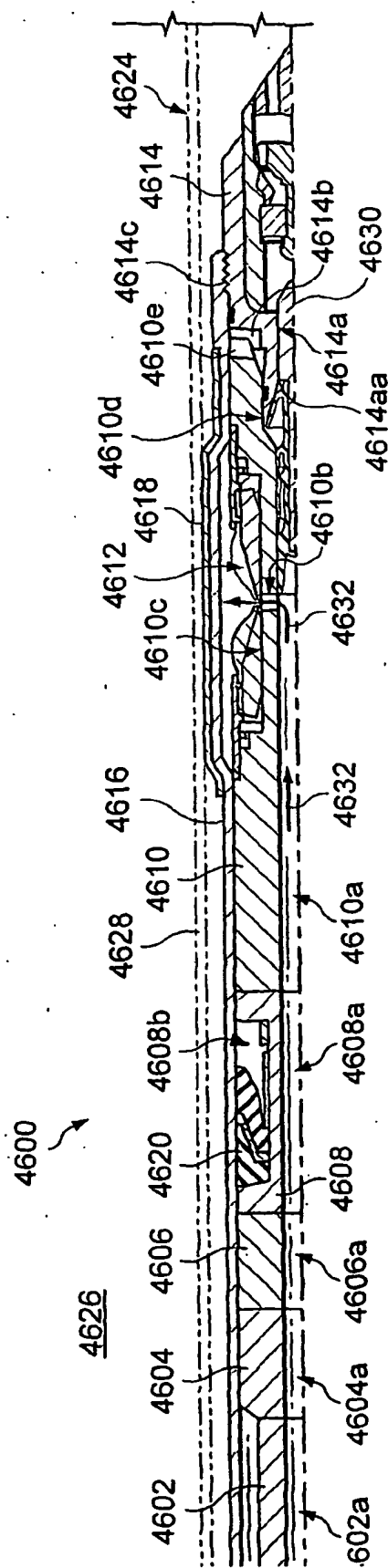


Fig. 46d

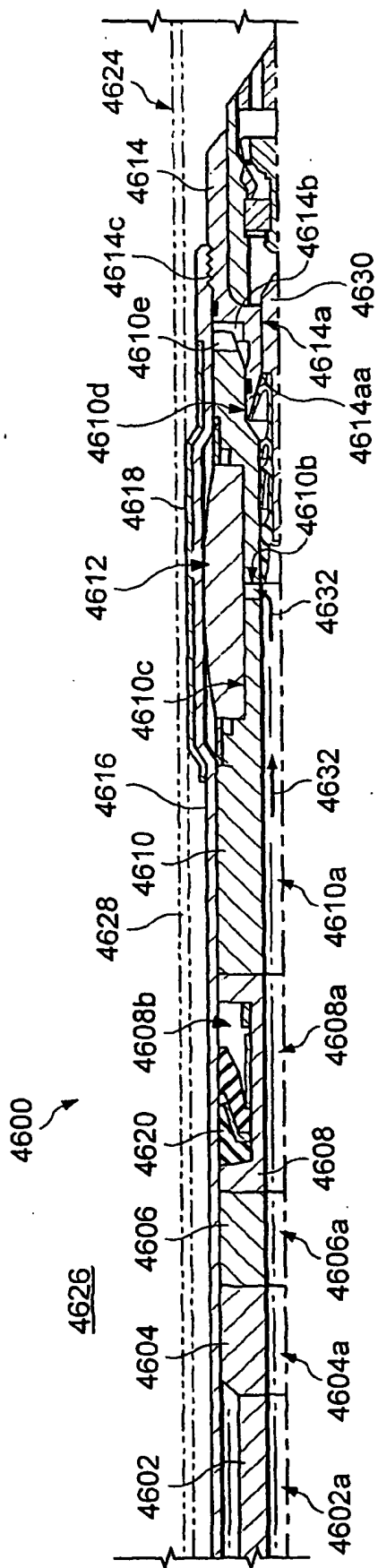


Fig. 46e

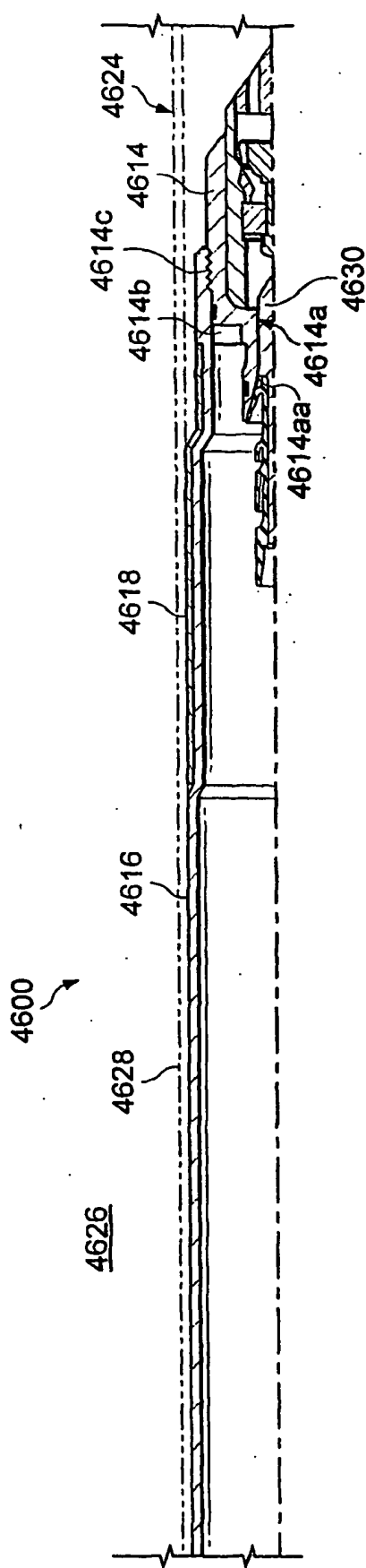
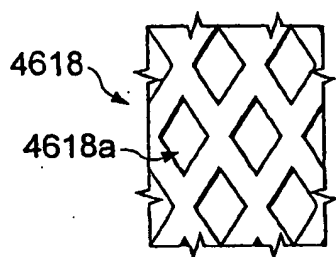
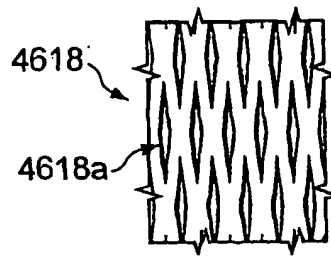


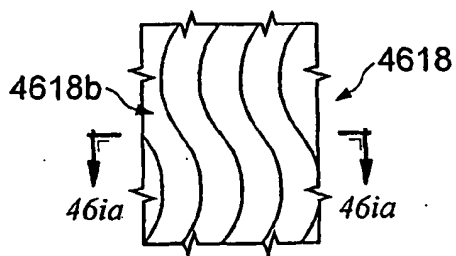
Fig. 46f



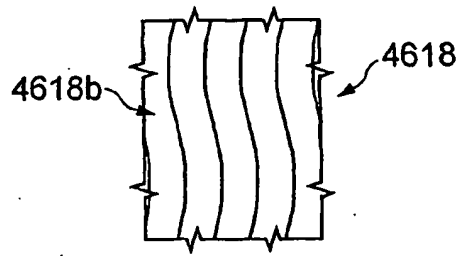
*Fig. 46g*



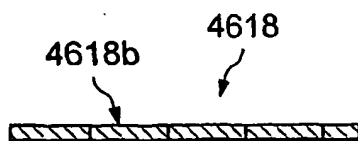
*Fig. 46h*



*Fig. 46i*

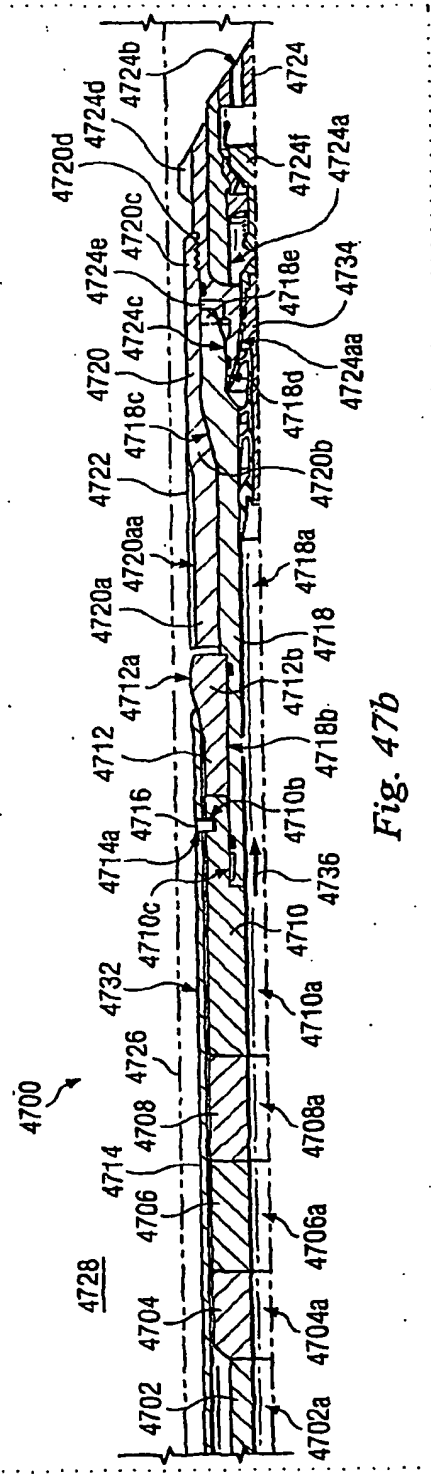
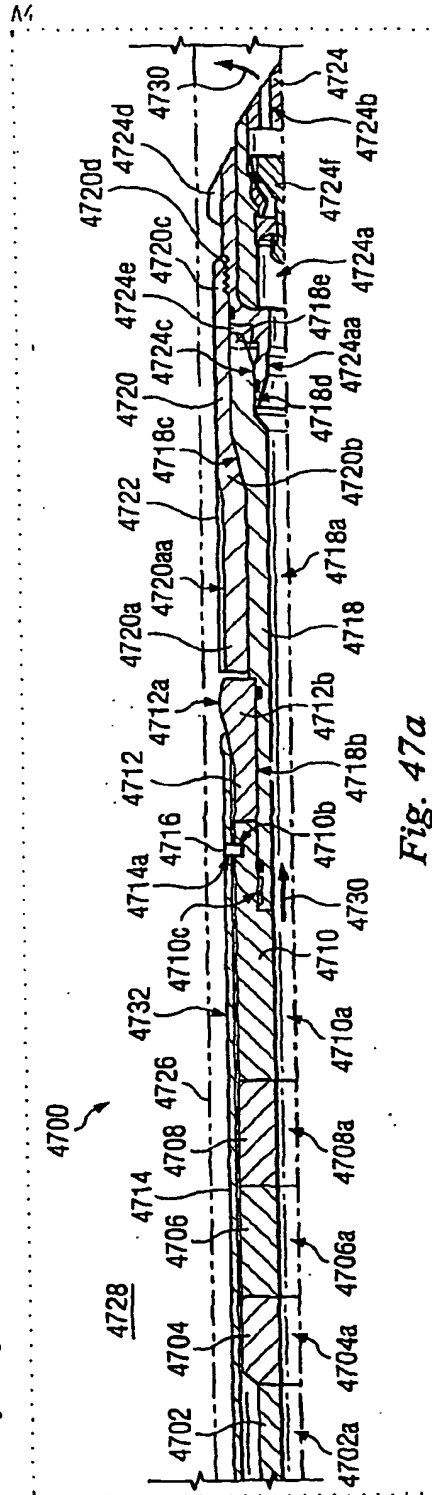


*Fig. 46j*



*Fig. 46ia*

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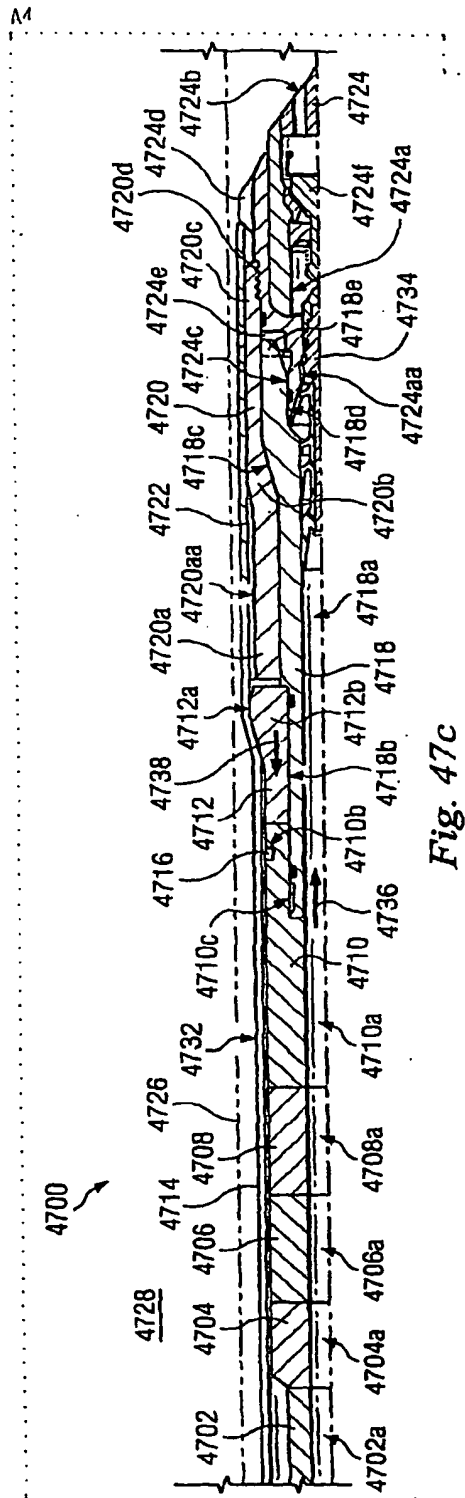


Fig. 47c

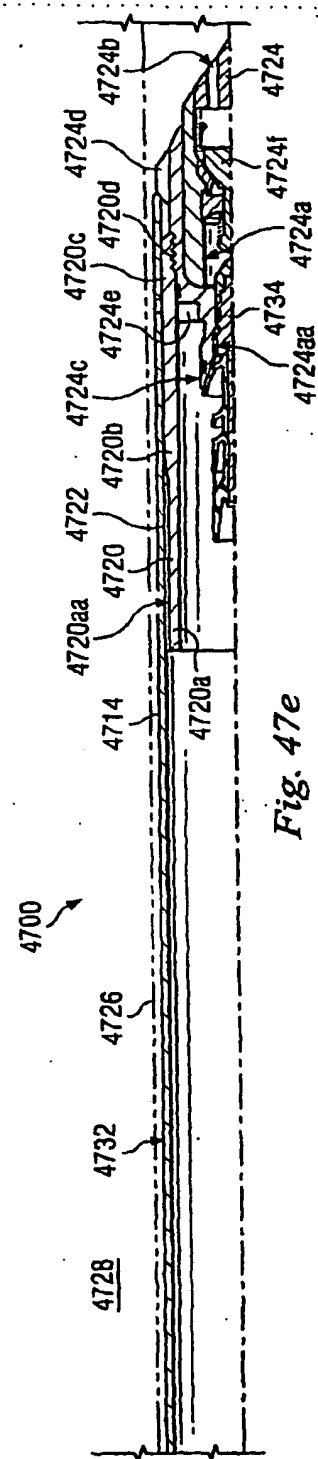


Fig. 47e

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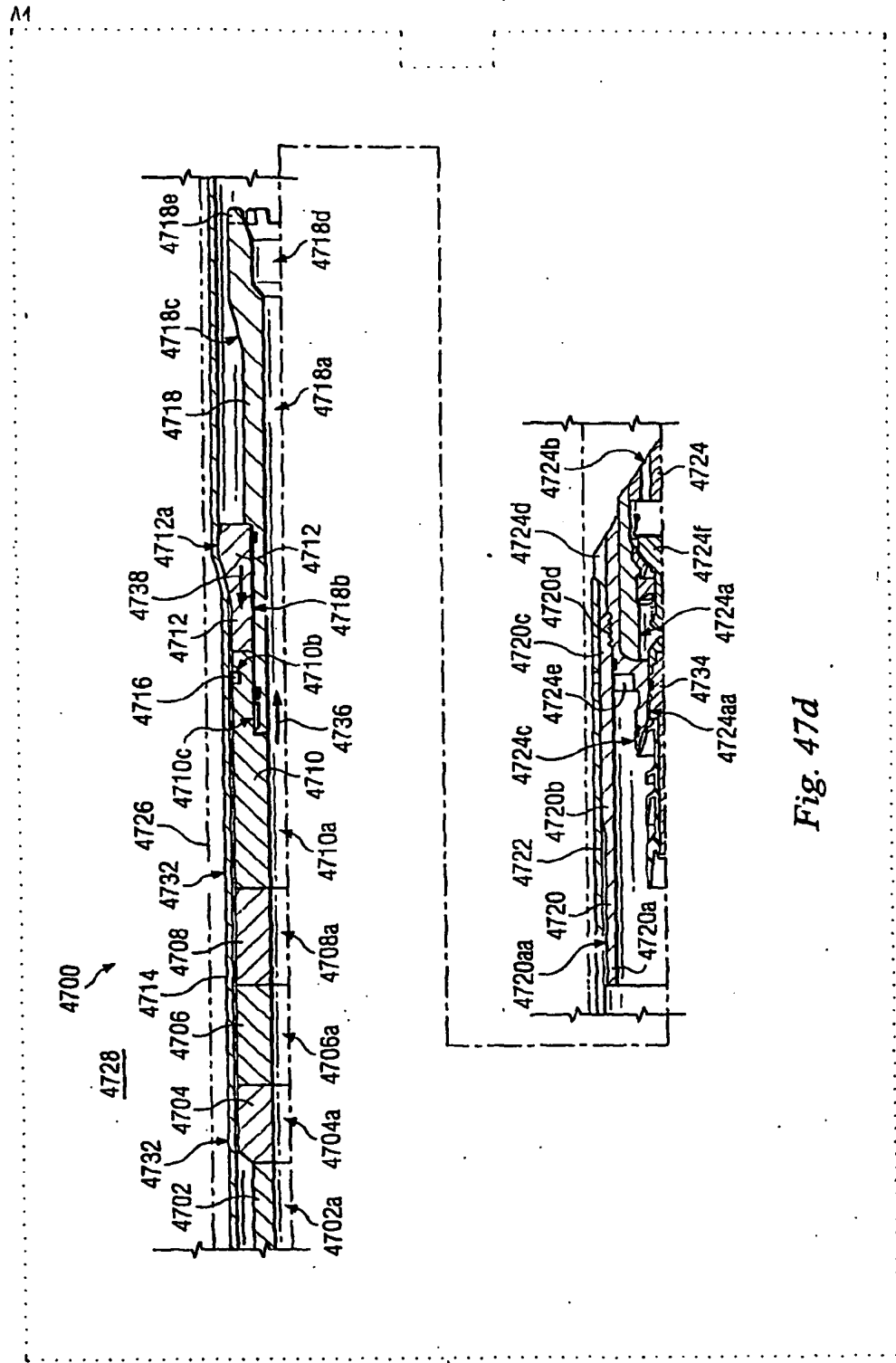
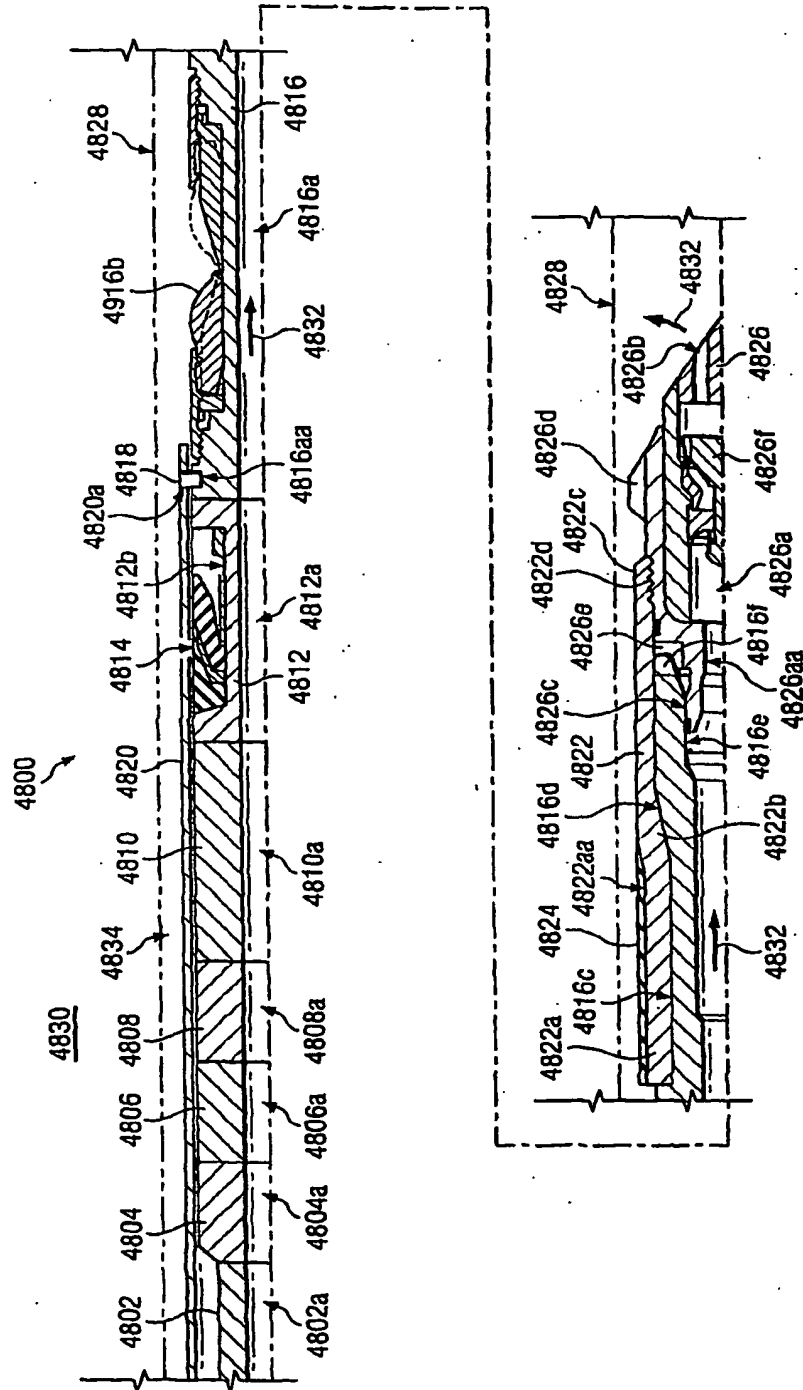


Fig. 47d

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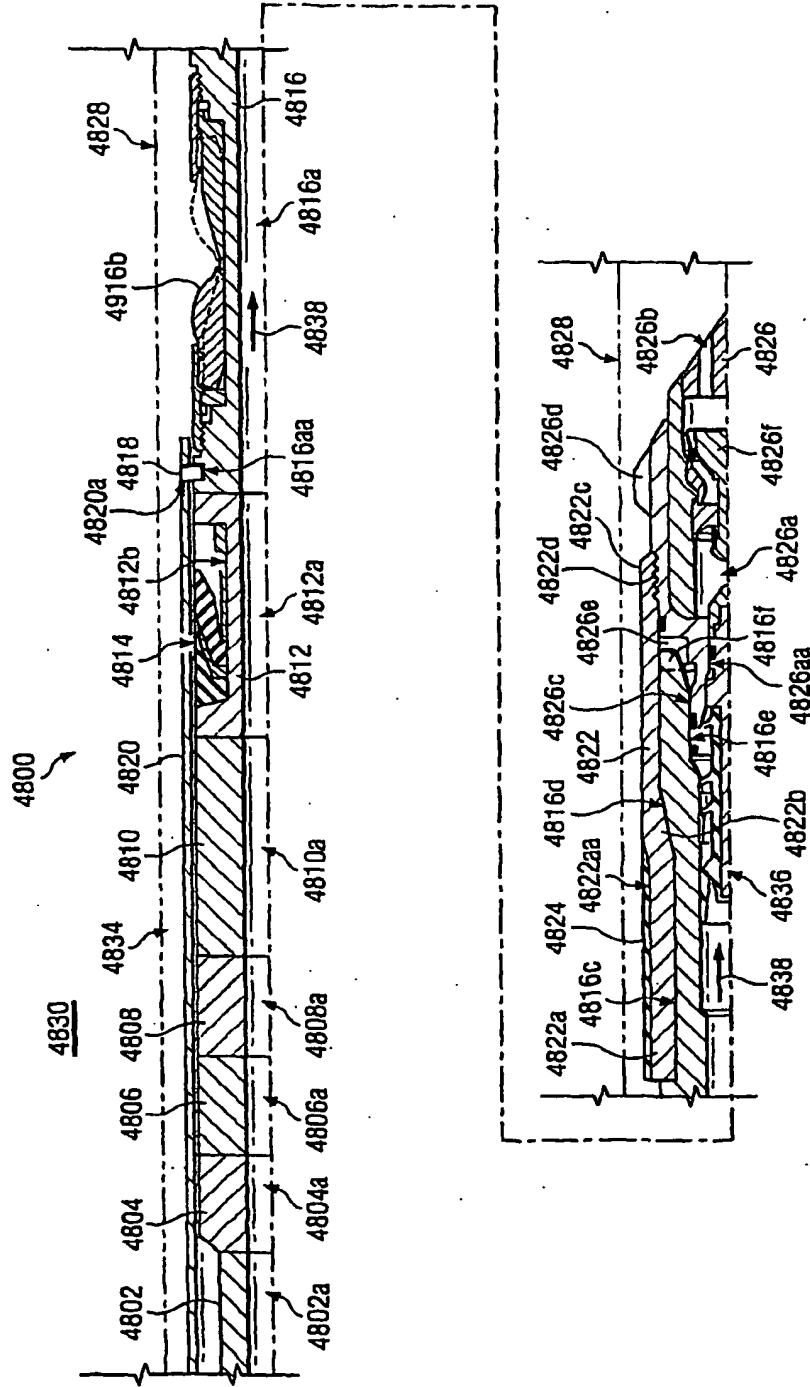


Fig. 48b

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DRAFT DRAWINGS \*\* PLEASE DO NOT FILE WITH THIS COPY!! PLEASE CONTACT PATENT ART FOR SAME-DAY DELIVERY OF FINAL DRAWINGS

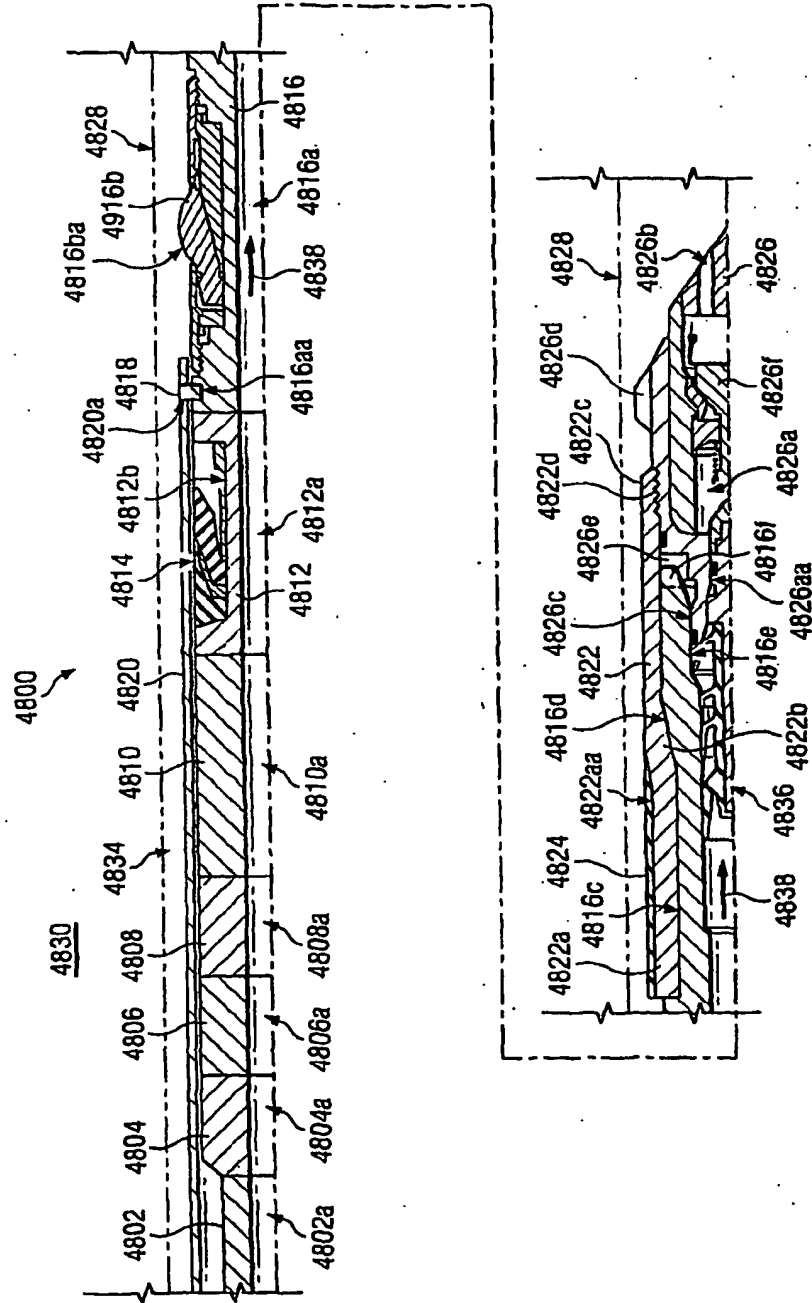


Fig. 48c

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DRAFT DRAWINGS \*\* PLEASE DO NOT FILE WITH THIS COPY!! PLEASE CONTACT PATENT ART FOR SAME-DAY DELIVERY OF FINAL DRAWINGS

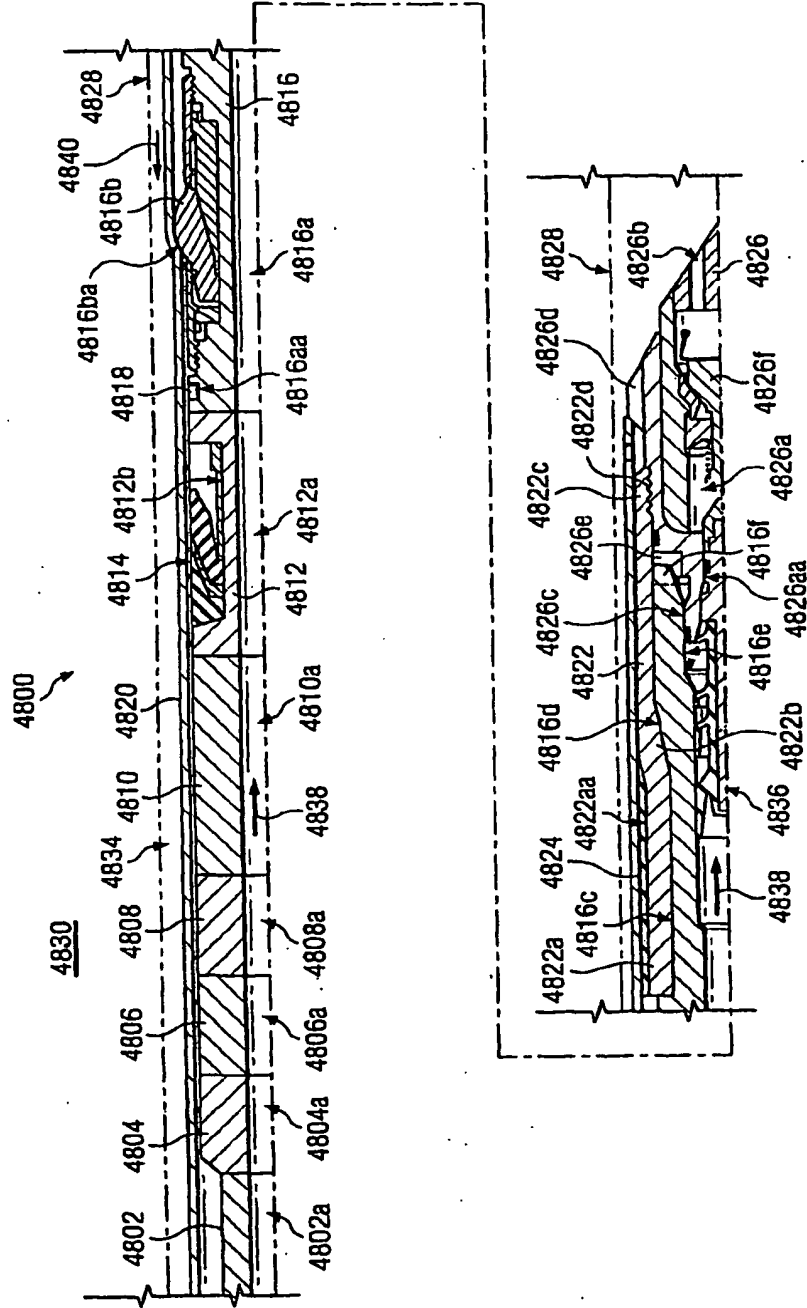


Fig. 48d

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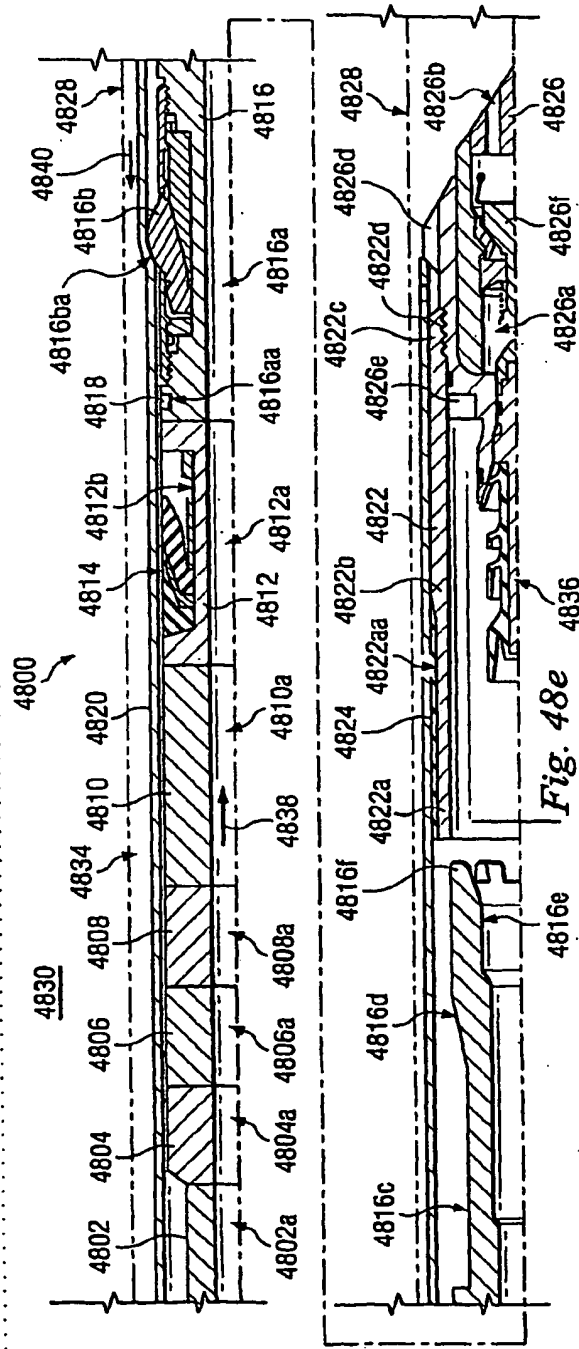


Fig. 48e

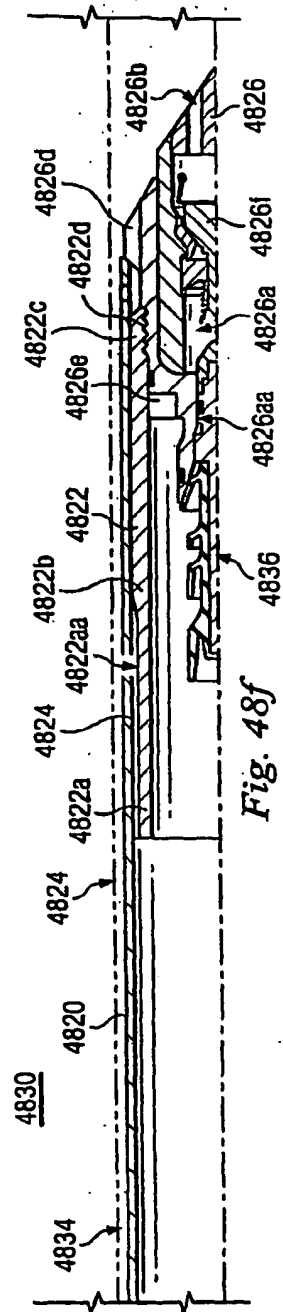
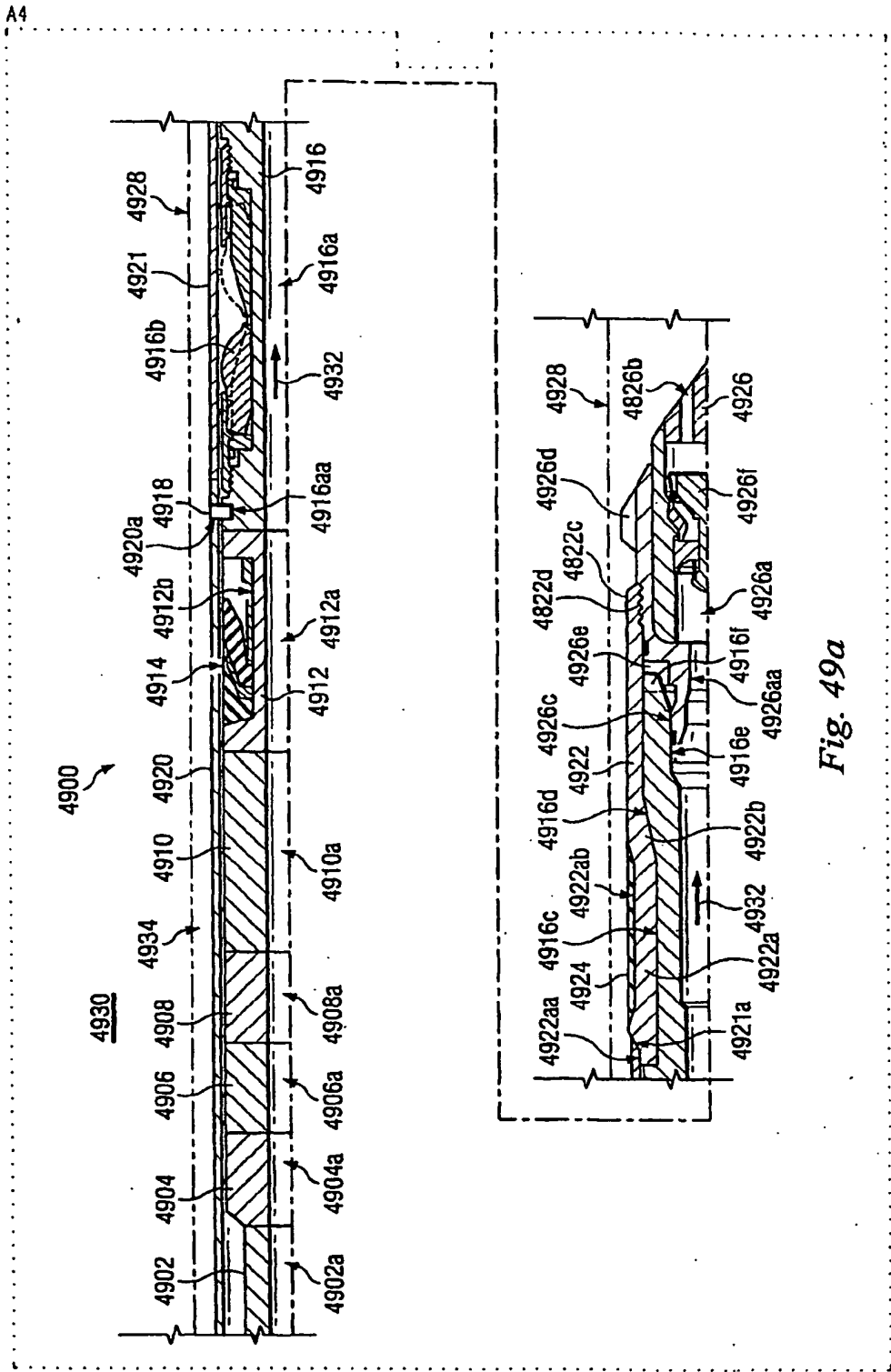


Fig. 48f

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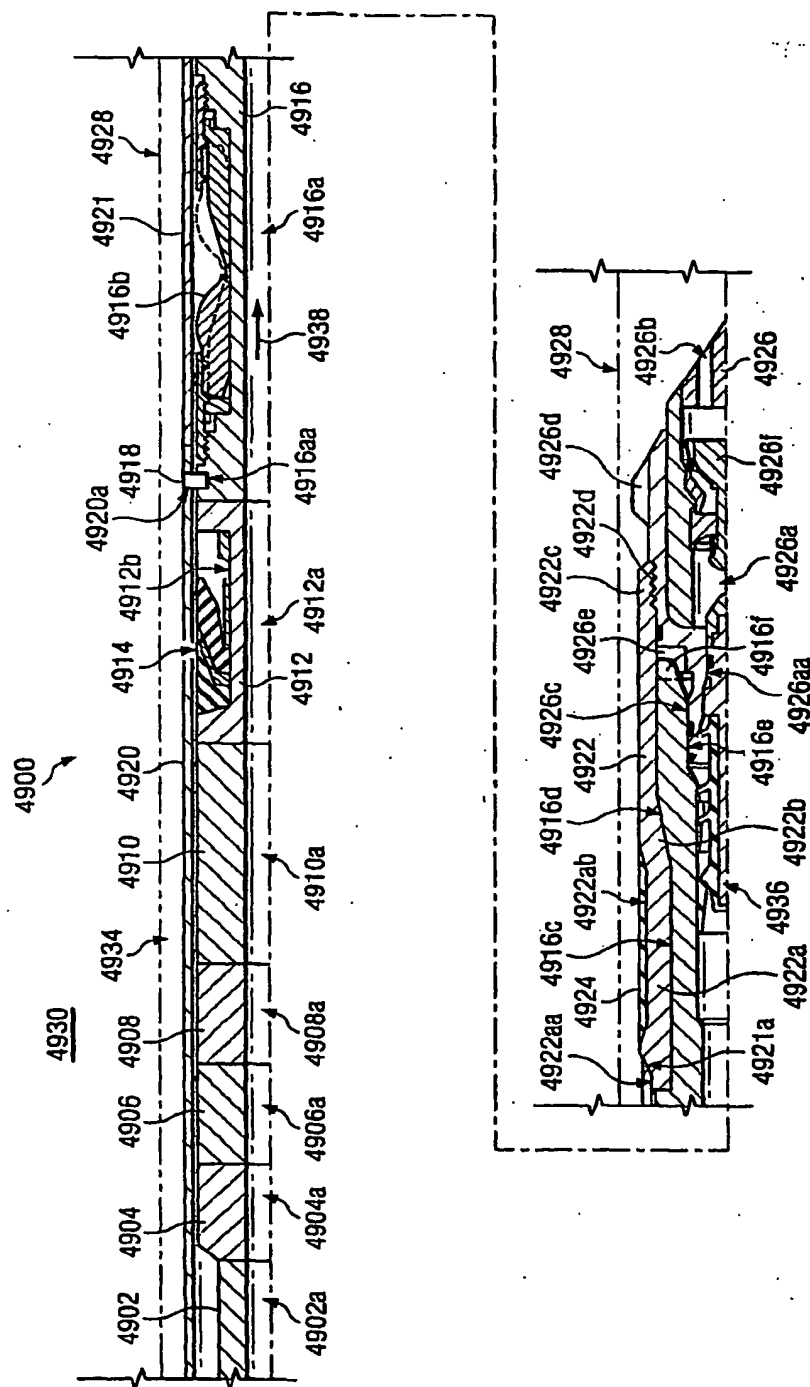


Fig. 49b

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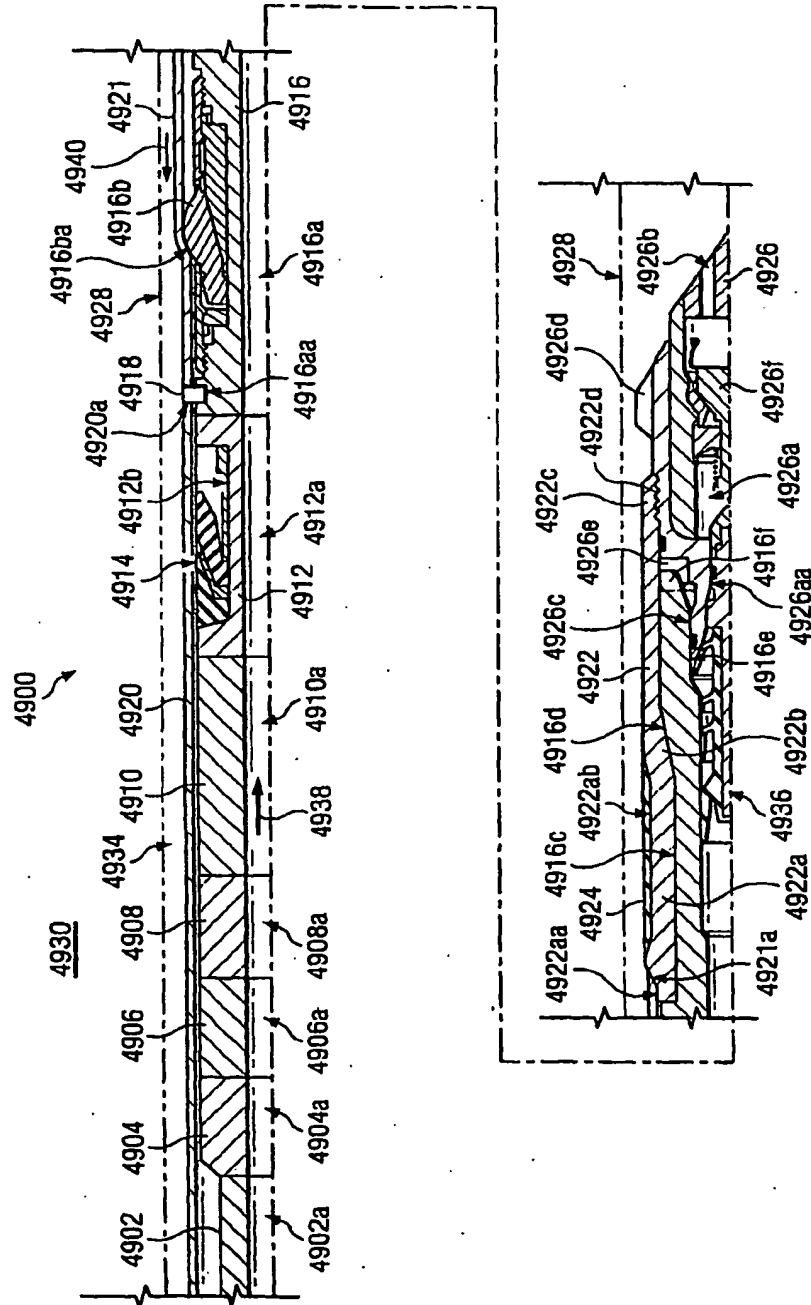
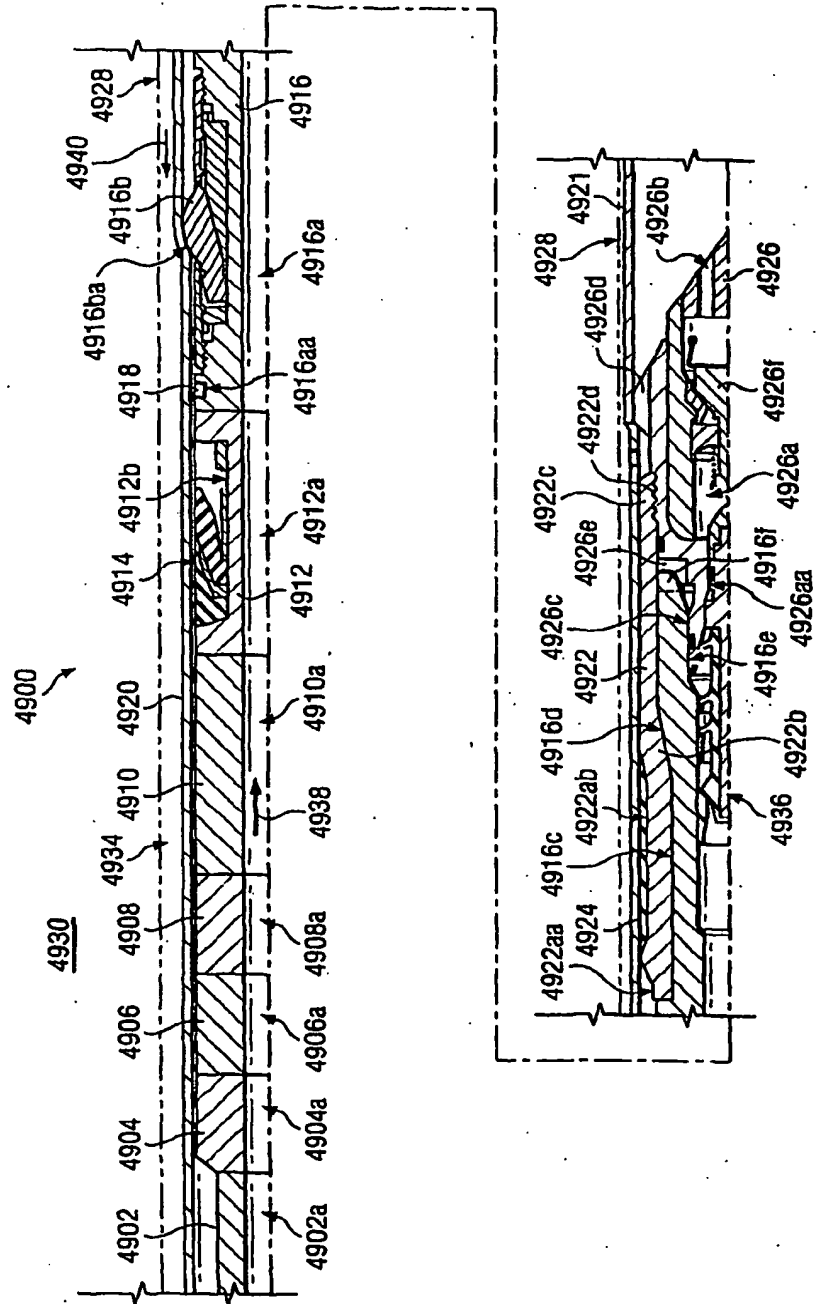


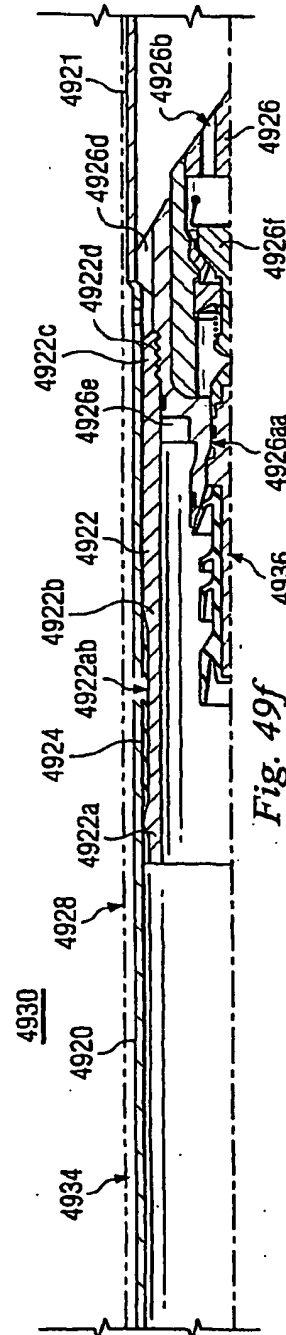
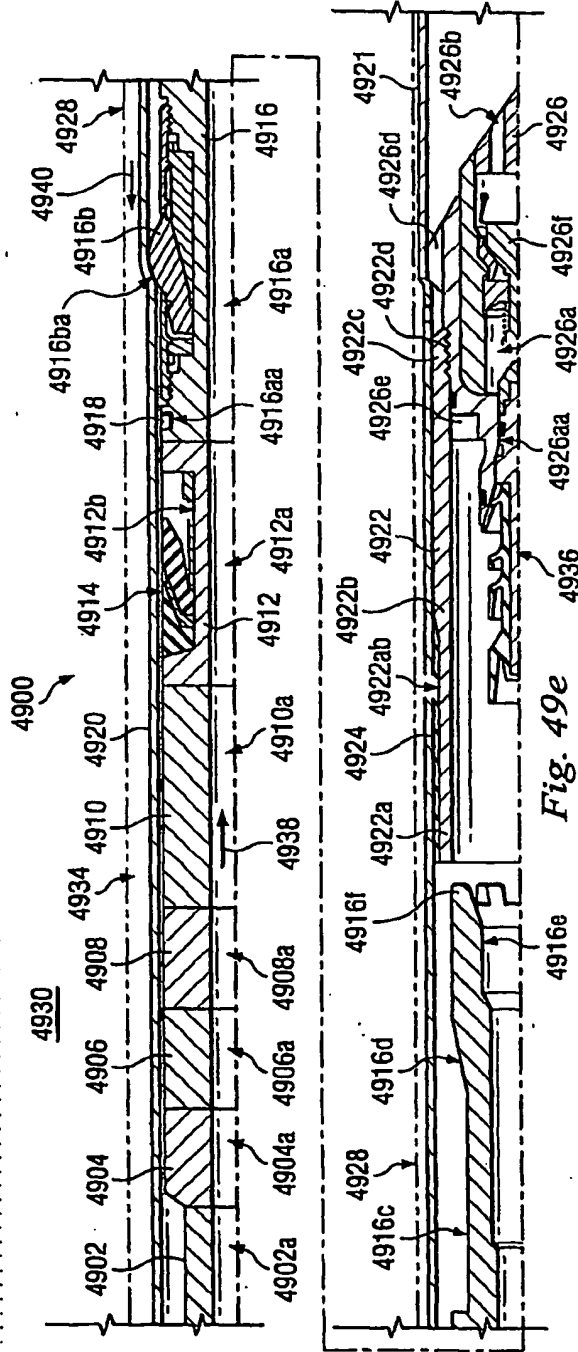
Fig. 49c

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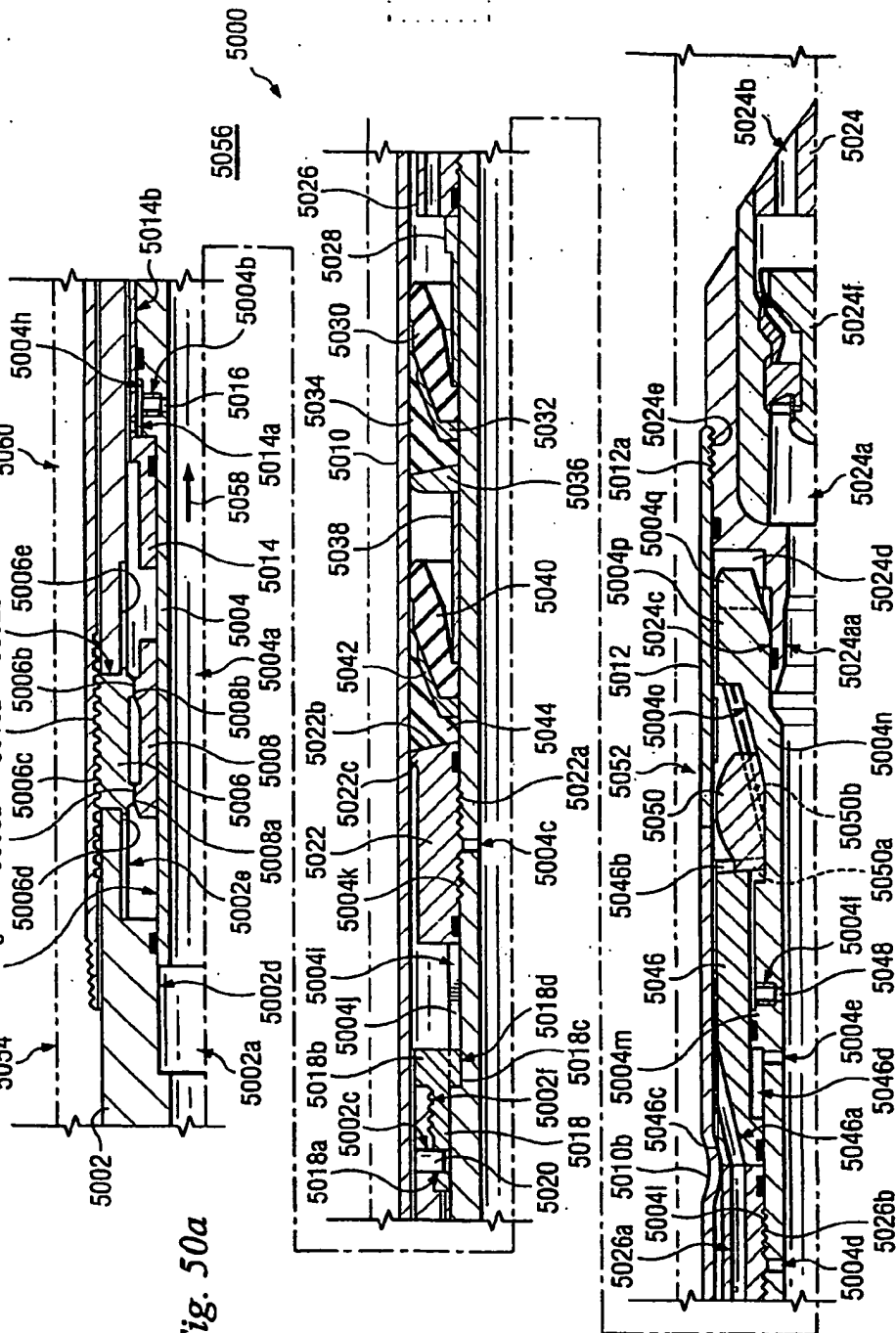
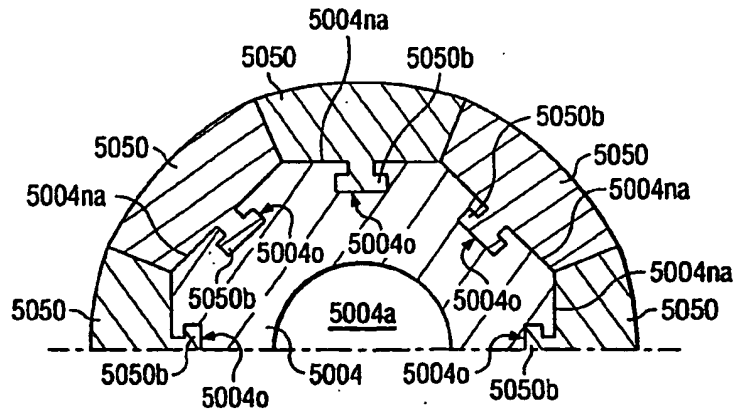
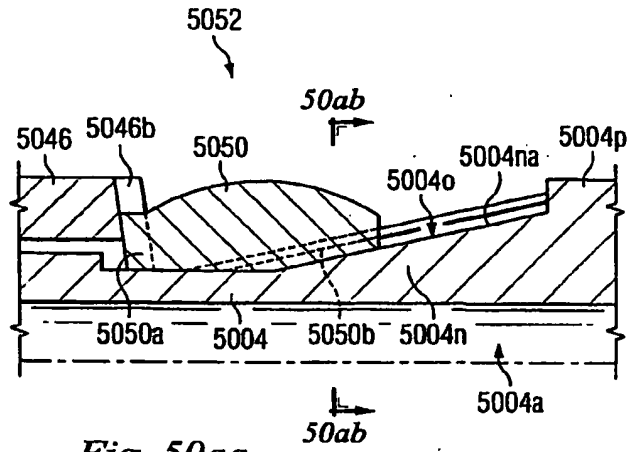


Fig. 50a

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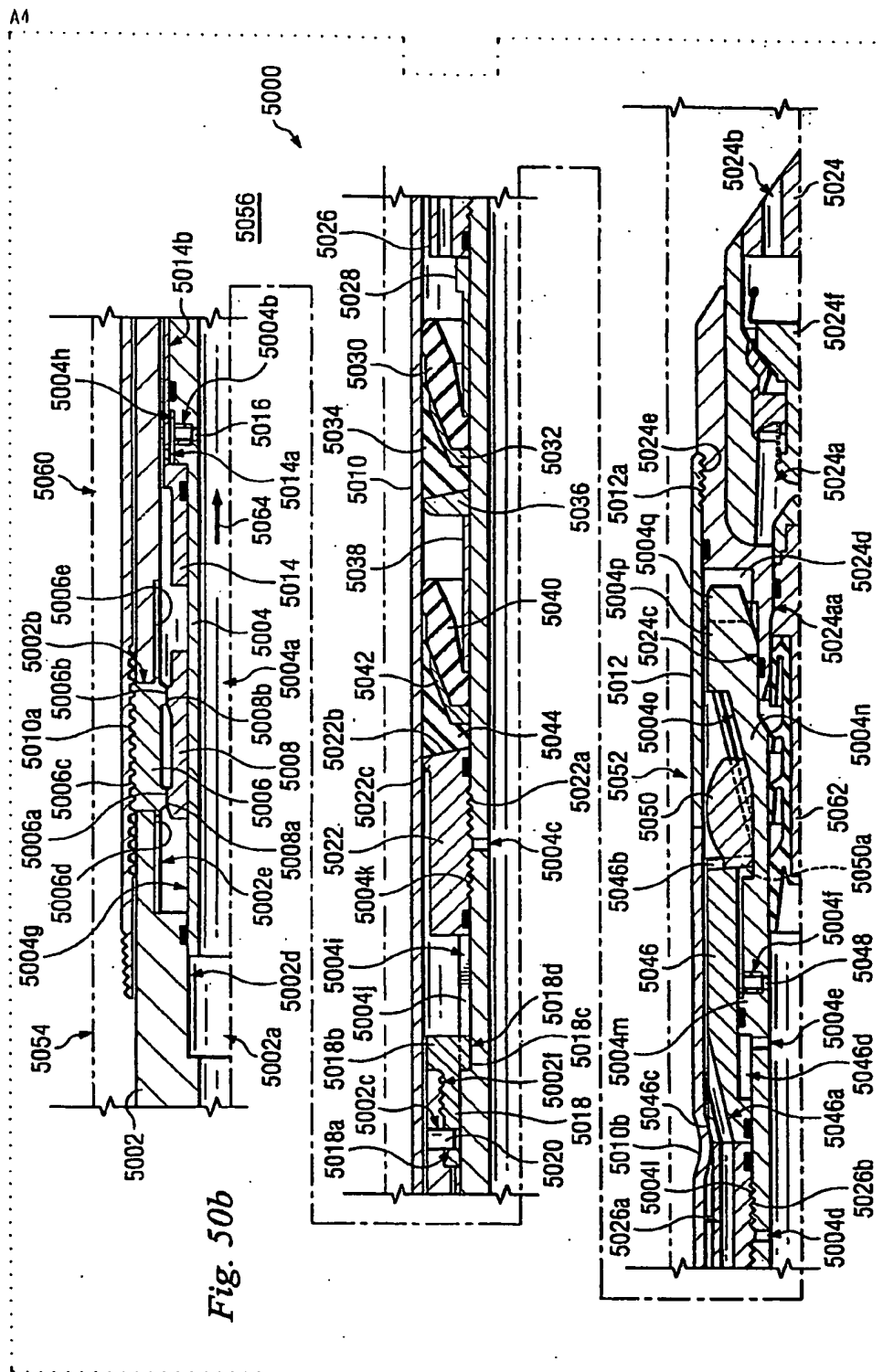
A4



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A4

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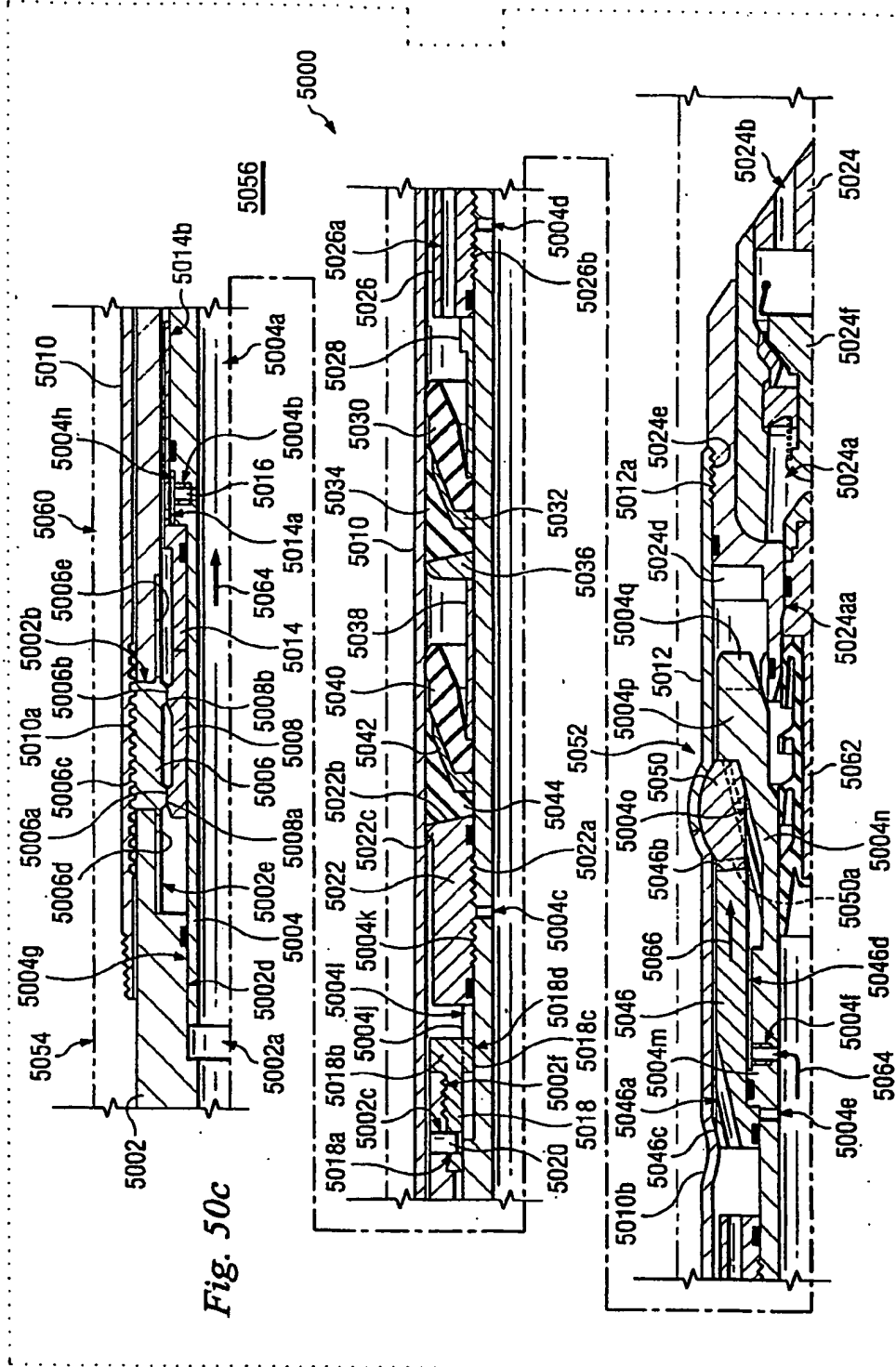
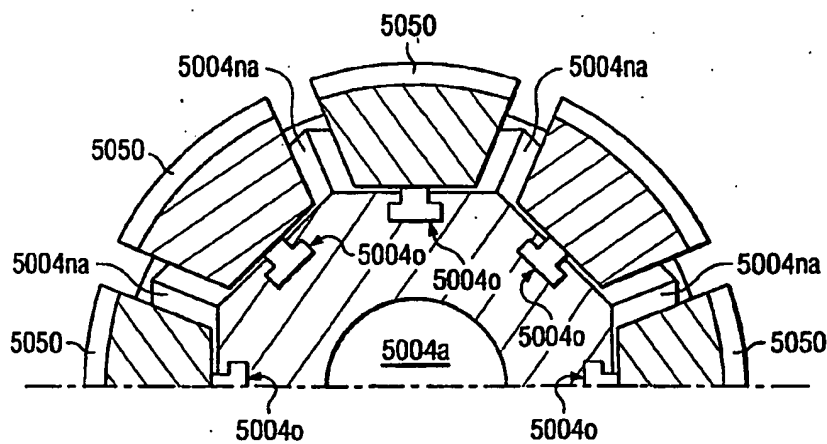
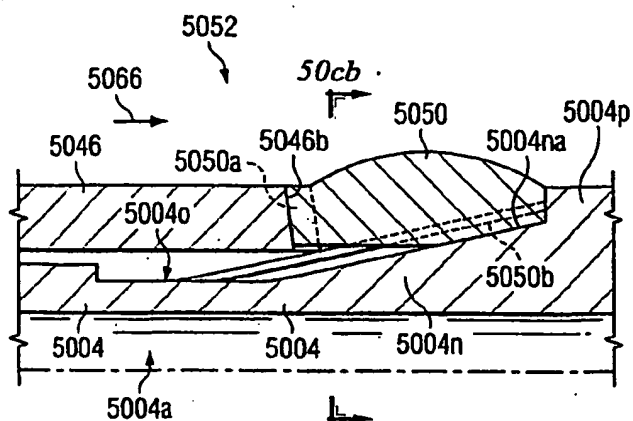


Fig. 50c

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A4





A4

DRAFT DRAWINGS \*\* PLEASE DO NOT FILE WITH THIS COPY!! PLEASE CONTACT PATENT ART FOR SAME-DAY DELIVERY OF FINAL DRAWINGS

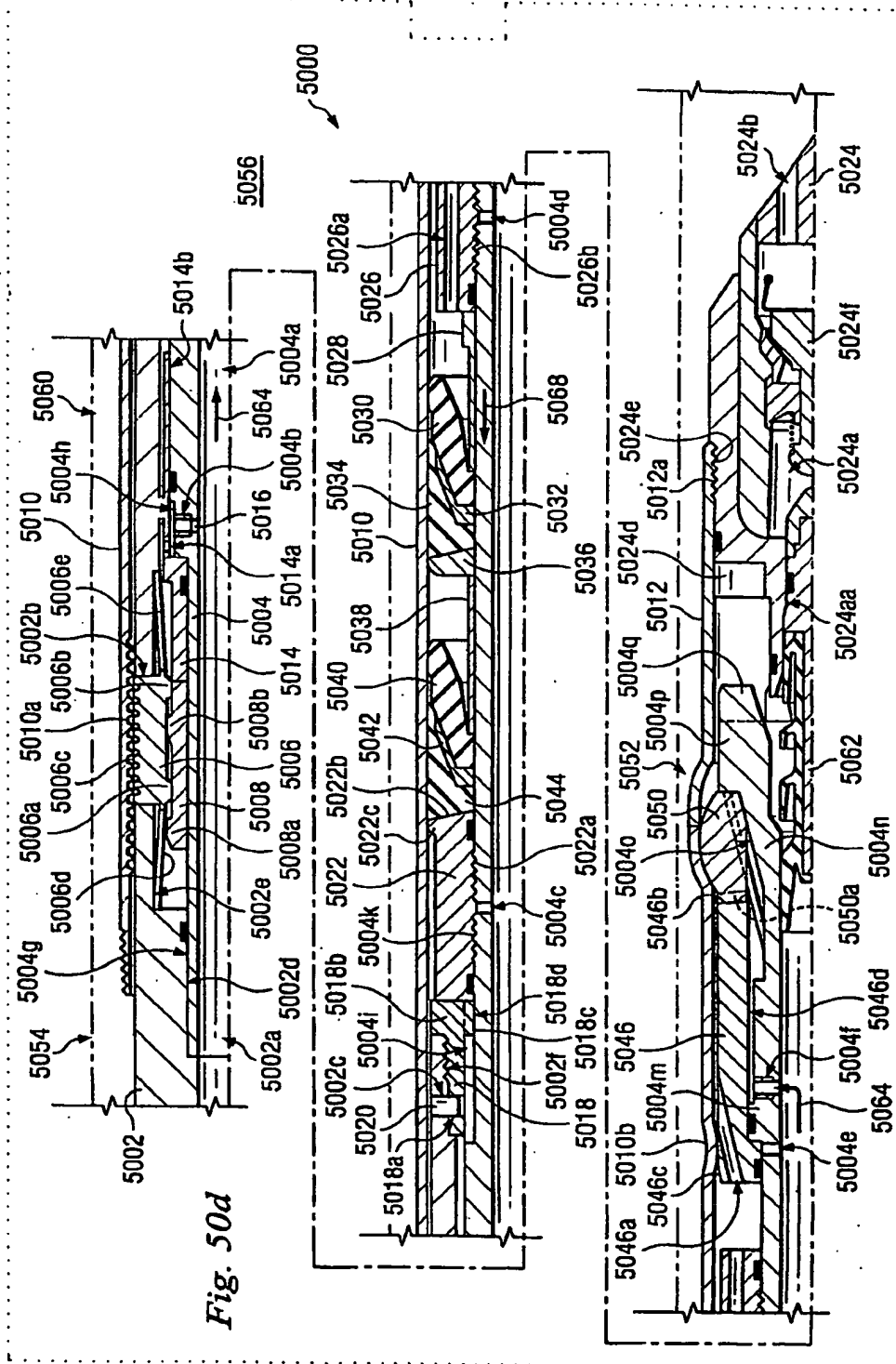


Fig. 50d

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A4

DRAFT DRAWINGS \*\* PLEASE DO NOT FILE WITH THIS COPY!! PLEASE CONTACT PATENT ART FOR SAME-DAY DELIVERY OF FINAL DRAWINGS

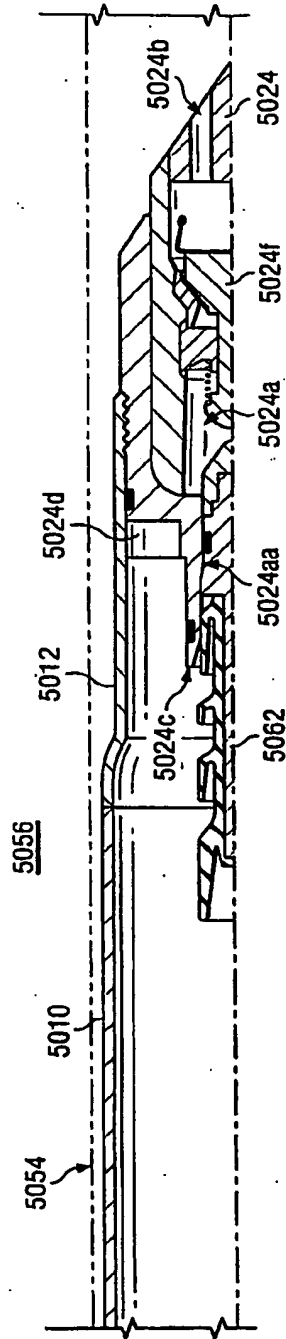


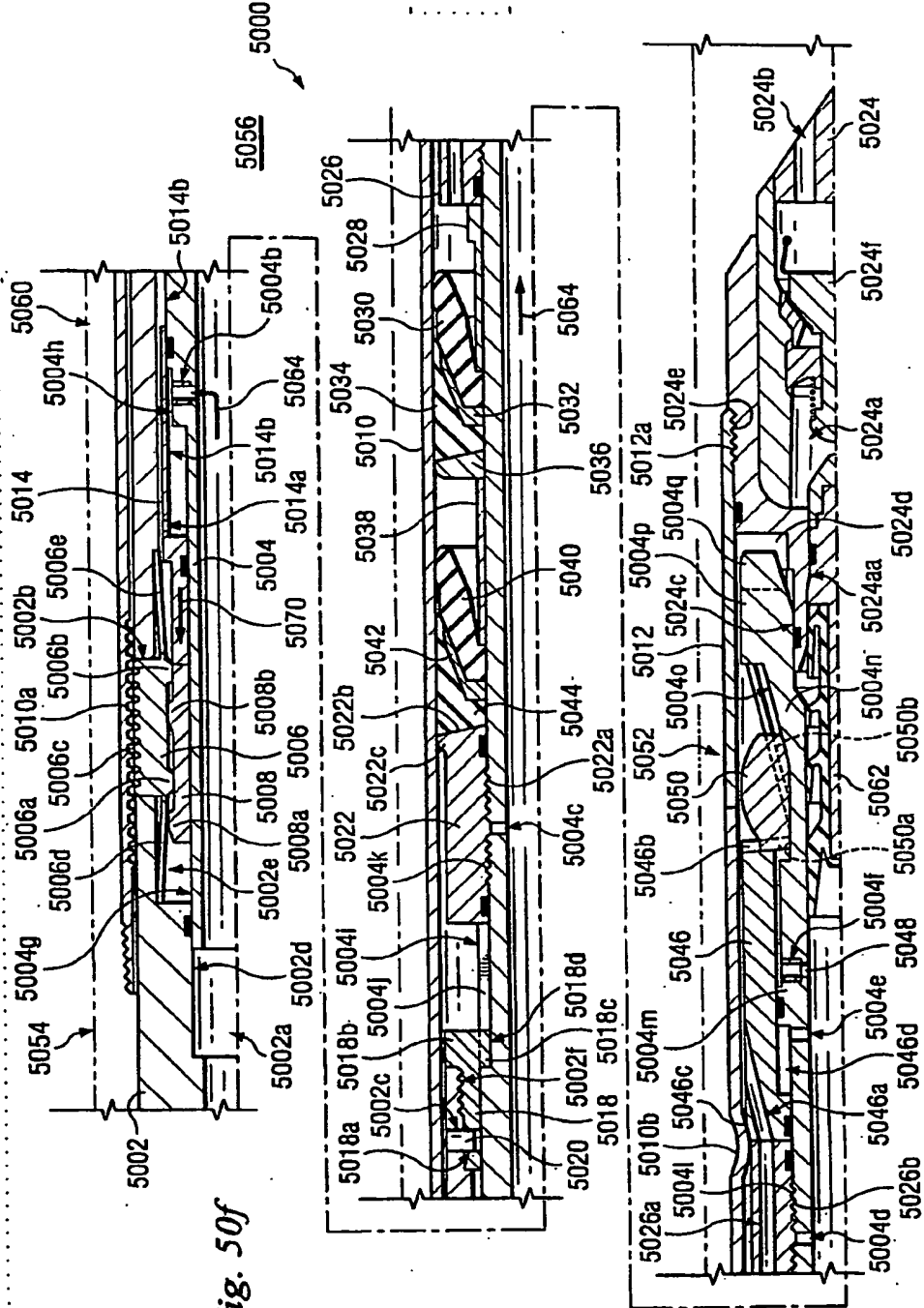
Fig. 50e

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Fig. 50f



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